

# NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING



The buzz at Interop...

## ATM and Gigabit Ethernet camps collide

Start-up preps price-busting ATM gear.

By Jodi Cohen

Atlanta

Convinced that ATM is too pricey for your PC? Start-up Avidia Systems, Inc. is looking to change your mind by offering ATM switches for \$199 per port.

Largely because of cost, ATM

has been considered appropriate for only high-speed backbone applications. But Avidia's 25M bit/sec ATM switches — which will be on display here at NetWorld+Interop 96 this week — make ATM affordable for the desktop, according to industry observers.

### AVIDIA'S ATM SWITCH FAMILY

**ACX-1200:** 120-port 25M bit/sec ATM access switch with up to 10 155M bit/sec ATM uplinks and a variety of WAN interfaces

**ACX-100:** 12-port 25M bit/sec ATM workgroup switch with 1 155M bit/sec ATM uplink

**ACX-300:** 36-port 25M bit/sec ATM departmental switch with 3 155M bit/sec ATM uplinks



At \$199 per desktop or LAN server connection, the Avidia ATM switches are a quarter of the cost of competitor FORE Systems, Inc.'s desktop devices and a third less than switches from Madge Networks, Inc.

"This is extremely aggressive pricing," said Rick Malone, principal at Vertical Systems. See ATM, page 161

3Com backs both high-speed options.

By Jodi Cohen

Atlanta

Unlike some vendors that want customers to choose between ATM and Gigabit Ethernet, 3Com Corp. doesn't really seem to care.

Both ATM and Gigabit Ethernet will figure prominently in 3Com's announcement of 17 high-speed switches that promise to boost network capacity for packet- and cell-based LANs. The switches, to be unveiled at NetWorld+Interop 96, will be unveiled at NetWorld+Interop 96. See 3Com, page 158

AT&T alliance may be first to offer international ATM service. Page 159.

Gigabit Ethernet Alliance wins over ATM stalwarts IBM and FORE Systems.

By Michael Cooney and Jodi Cohen

Atlanta

The fantasy of ATM has met the reality of Gigabit Ethernet.

Two of the industry's biggest ATM bigots — FORE Systems, Inc. and IBM — this week will join the Gigabit Ethernet Alliance, sending one of the strongest signals yet that vendors must support both high-speed technologies to compete.

Sources close to both companies confirmed that FORE and IBM will join the alliance at this week's NetWorld+Interop 96 here. The alliance was formed in May to promote the development, standardization and rapid

### FORE-TUNE TELLER

Asked whether FORE Systems will embrace Gigabit Ethernet, the ATM leader's CEO Eric Cooper says:

"Embrace" might be a strong word. Let's just say support."

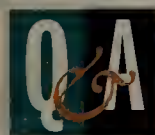
More from our interview with Cooper, page 12.



introduction of high-speed Ethernet products. Membership in the group now totals around 60, including Cisco Systems, Inc., Bay Networks, Inc., 3Com Corp., Compaq Computer Corp. and See Alliance, page 158

## New Novell prez meets the press

Marengi attempts to put end to Novell's defensive image.



As a sales executive, how are you qualified to lead Novell? Will you meet with

Bill Gates? How does it feel to be put on the defensive constantly despite your No. 1 ranking in the NOS market?

Newly anointed Novell, Inc. President Joe Marengi fielded these and other feisty questions posed by Network World Senior Writer Christine Burns when they met in New York last week.

See Novell, page 160



On acquisition rumors, Joe Marengi says "We are positioning the company as a total stand-alone."

## Internet health report: condition serious

First of a two-part story

By Charles Bruno



If you're steering some of your organization's mission-critical applications onto the Internet's information highway, you'd better turn around now — while you still can.

Network World has just concluded a monthlong investigation into the health of the Internet that included two surveys — one of Internet service providers and the other of Network World readers — plus interviews with ISPs, users and leading experts. The conclusion: The 'Net is not reliable enough today to handle many strategic business applications. Further, Continued on page 104



Bill Norton and Craig Labovitz of Merit Systems, both professional Internet statisticians, say 'Net performance has dipped since the NSFNet break-up and congestion is getting worse.

## New FCC phone rules could save you big dough

By David Rohde and Tim Greene

A major consultancy is about to drop a dime on how to save big money on your long-distance bill: become a local phone company.

The Yankee Group consultancy in Boston plans next week to push the strategy as a way to save hundreds of thousands of dollars per year. But it could be too good to be true, other experts cautioned.

Yankee Group President Howard Anderson says that by becoming local exchange carriers (LEC), users can legally duck switched access fees to regional Bell operating company networks.

Corporate telecom chiefs could become heroes avoiding See Phone rules, page 158

NEWSPAPER \$5.00

800

Access Network World Fusion using the number in yellow. See page 5 for details.




ONE DAY YOUR LOCAL  
PHONE LINES  
MAY BECOME  
SEVERED,



BUT THANKS TO  
THE TCG SELF-HEALING NETWORK  
YOUR HEAD  
WILL NOT.

TCG'S REDUNDANT ELECTRONICS PROTECT YOUR COMMUNICATIONS. AND YOUR JOB.

The calls and transactions your employees make every day are vital to your company's success. That's

why TCG works so hard  to keep things running seamlessly. Our network is up an unsurpassed


99.99+%. Proactive monitoring, 24 hours a day, 7 days a week, by our state-of-the-art Network Management

Center enables us to eliminate problems before you ever see them. We're in 51 major markets,\* providing

unprecedented access to the latest advances in voice, data and image telecommunications. And our

competitive rates should provide you with significant savings over what you're currently paying.

TCG has been safeguarding networks and heads at big companies and small since 1985.

We're ready to do the same thing for you. Give us a call  at 1-800-889-4TCG, and we'll send

you a free informative interactive disk, or simply fill out the coupon below and send it to us.

----- FREE TCG INTERACTIVE DISK -----

Call 1-800-889-4TCG (4824). Or send to: TCG, Dept. MD, One Teleport Drive, Staten Island, NY 10311-1011.



Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_ Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Phone (    ) \_\_\_\_\_ Mac \_\_\_\_\_ Windows \_\_\_\_\_

*The other local phone company.™*







Network with the world  
without the world getting  
into your network.

**Sprint's discrete network offers  
the ultimate in intranet security.**

Sprint's built an intranet network that's head and shoulders above the competition. It's the only separate IP network dedicated exclusively to corporate intranets—not the public Internet. So your employees, customers and business associates can access your corporate data with complete security and confidence, from anywhere in the U.S.

Sprint installs, monitors and manages your intranet 24 hours a day. Using the TCP/IP standard, your data travels over an all digital, fiber optic network at dial speeds up to 28.8 kbps and dedicated speeds up to DS3.

Sprint's already the world's leading carrier of Internet traffic. And now, we've taken the next step to put your intranet above the crowd, by delivering the security, performance and reliability your business needs.

Call Sprint Business  
**1-800-993-7325**  
[www.sprint.com/ip](http://www.sprint.com/ip)



*We help business do more business<sup>SM</sup>*



**This Week**



To quickly get to any online info referenced in Network World, type its DocFinder number in the input box on the main page.



**News+**

Link to Network World Fusion for daily reports from the floor of NetWorld+Interop.

- The Internet: How congested is the 'Net? Download video maps showing daily congestion and tools for measuring it on your own and read comments by the people who run various parts of the 'Net. DocFinder: 9603.
- Novell: Read the complete transcript of our interview with new Novell President Joe Marengi. DocFinder: 9610.
- ATM: Grab the complete transcript of our interview with FORE CEO Eric Cooper on the challenges facing ATM. DocFinder: 9608.
- Desktop ATM: Read articles on 25M bit/sec ATM plans from FORE and Madge and take a look at two analyses of how ATM will fare on the LAN against technologies such as Gigabit Ethernet. DocFinder: 9612.
- FRADs: Download a primer to enterprise use of frame relay and see what to consider before moving SNA traffic onto frame relay. DocFinder: 9604.
- Symmetric multiprocessing: Read vendor white papers that explain their SMP strategies. DocFinder: 9602.
- Electronic commerce: Read up on the new joint venture by IBM and several banks to move banking onto the 'Net and download white papers from two competing efforts. DocFinder: 9611.

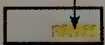


**NetRef**

- ATM products: Download a chart (in WinWord 6.0 or PDF) with extensive product spec and pricing info for the ATM products discussed in this week's Buyer's Guide (page 90). DocFinder: 9601.
- Client/server messaging: Read what beta users of Novell's GroupWise 5.0 think. DocFinder: 9607.

**HOW TO GET ON TO NETWORK WORLD FUSION**

At the welcome screen, click on Registration and follow the instructions. Subscribers, keep your NWF number — highlighted on the front cover's mailing label — handy during registration. Non-subscribers must fill out an online registration form.



Get daily coverage of NetWorld+Interop, including exclusive video interviews with newsmakers. Click on the "Interop TV" button on the main page.

# Contents

**News**

- 6 Microsoft preps** more robust editions of its Exchange messaging software.
- 8 Internet debate** highlights domain name issues.
- 10 IBM gives** IS new mainframes to chew on.
- 12 FORE CEO** Eric Cooper stands up for ATM.
- 14 Coming next year:** 56K bit/sec modems.
- 14 MCI bundles** local and long-distance services for business customers; targets midsize firms with outsourcing service.
- 16 Vendors** at Internet commerce show focus on secure electronic selling.

**WANs & Internetworking**

- 21 Racal Datacom** makes foray into FRAD market.
- 21 Interop: RAScom** launches ISDN dial-up server.
- 25 Lucent adds** ATM dynamic bandwidth allocation to Definity voice traffic.
- 27 DSU/CSU vendor** targets WAN management.

**Carrier Services**

- 33 AT&T lets** government workers phone home.
- 33 MCI to roll out** integrated billing platform.
- 37 Sprint releases** real-time customer mgmt. service.

**Local Networks**

- 41 HP, Dell debut** server lines with attractive pricing.
- 41 Interop: Microsoft** announces server-based multimedia capabilities.
- 46 OS/2 Warp Server SMP** packs a wallop, users say.

**Client/Server Applications**

- 53 Novell continues** uphill battle in messaging war with release of GroupWise 5.
- 53 Praxis unveils** tools for managing data movement enterprisewide.
- 54 Object Design database** gives desktops more Web power.

**Intranets & the 'Net**

- 73 IBM, under CEO Lou Gerstner** (right), and 15 banks team in cyberbanking effort.
- 76 Interop: CyberGuard** releases new firewall.



**Technology Update**

- 83 Transparent LAN service** discloses connectivity option.

**NetworkWorld's Mission:** To provide news and analysis that help network IS professionals deliver the network computing infrastructure and distributed applications required to meet evolving business needs.

Lotus Notes replicated by Java start-up. **Page 6.**

Seagate targets enterprise management market with eclectic product mix. **Page 8.**

Stanford Telecom ready to offer shrink-wrapped OpenView app. **Page 10.**

GigaLabs unveils PCI-based technology for high-speed server connections. **Page 10.**



**Management Strategies**

- 127 Coopers & Lybrand's** chief knowledge officer talks about why the firm created her new position.

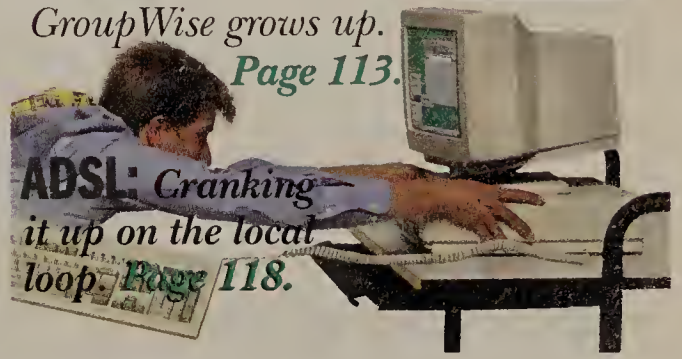
**Opinions**

- 32 Scott Bradner** gets fired up about firewalls.
- 48 Dave Kearns** vents his frustration over Microsoft browser and directory directions.
- 70 Daniel Blum** says meta directories could clean up the problem of incompatible directories.
- 86 Editorial:** ADSL makes sense.
- 86 Thomas Nolle** ponders intranet management.
- 87 Edwin Mier** offers tips for switching to switches.
- 88 Pro/Con** debate over ADSL.
- 162 Dave Buerger:** Users face software price hikes from nervous vendors.
- 162 Mark Gibbs:** 'A thought that makes me hazy, is it me or are others crazy?'

## Features

**Buyer's Guide:** With a palette full of products, you can start painting your ATM masterpiece. **Page 90.**

**Review:** Novell's GroupWise grows up. **Page 113.**



**Network Help Desk.** **Page 83.**

**Message queue.** Letters to the editor. **Page 87.**

**Editorial and advertiser indexes.** **Page 158.**



## News briefs, September 16, 1996

■ **Interop: CA plays it safe**

Computer Associates International, Inc. this week at NetWorld+Interop 96 will show its agnostic side by pledging support for both industry-sanctioned and Microsoft Corp.-driven desktop management. CA will join the Desktop Management Task Force and formally endorse the group's Desktop Management Interface specification as an industry standard for managing PCs. At the same time, CA will cover its bases by reiterating support for Microsoft's HyperMedia Management Schema, a blueprint for representing objects that can be managed from a Web browser.

■ **Interop: NIA opens its doors**

The trio of vendors that formed the Network Interoperability Alliance (NIA) — IBM, 3Com Corp. and Bay Networks, Inc. — this week will welcome four new members at NetWorld+Interop 96. Among the additions will be Xylan Corp. and Cascade Communications Corp., sources said. The group is also slated to unveil its testing lab, which will operate out of the University of New Hampshire, where interoperability testing is already taking place. The companies formed the NIA earlier this year to help accelerate implementation and development of existing standards for multi-vendor interoperability.

■ **Interop: Sun plots SEMinal event**

At long last, SunSoft, Inc. is expected to unveil Solstice Enterprise Manager (SEM) 2.0 at this week's NetWorld+Interop 96 show. SEM 2.0 is an end-user version of SunSoft's high-end, object-oriented network and systems management platform that incorporates DiMONS 3G technology from the former NetLabs, Inc. SEM 2.0 was initially scheduled to ship last December.

■ **Microsoft vs. Netscape: Round. . . ?**

Microsoft Corp. and Netscape Communications Corp. may wind up on opposite sides of an Internet standards battle again — this time over directory services for multimedia conferencing users. Microsoft recently announced its User Location Service (ULS), a directory that helps voice and data conferencing users find each other over an Internet Protocol network by keeping track of their IP addresses. Microsoft has proposed to the Internet Engineering Task Force that ULS' underlying protocol be adopted as an extension to the Lightweight Directory Access Protocol (LDAP) standard. Netscape, which just released a beta version of its LDAP-compliant directory server, does not support ULS, however, and will unveil an alternative later this year, according to a company official.

■ **More products streaming from Netscape**

Netscape Communications Corp. last week began a private beta test of a streaming server, according to a company official. The server, code-named Salmon, will be beta-tested by major entertainment companies that already use Netscape's Web servers, said Michael Po, director of Live Media at Netscape. The client, code-named Trout, will be a plug-in for the Navigator browser.

■ **It's about time**

Back in July, Microsoft Corp. first announced plans to serve up its ActiveX technologies to a standards body, claiming it would hold a meeting with customers and stakeholders to discuss the best approach. After pushing off that meeting date more than once, the company finally appears to have settled on Oct. 1 in New York. Invitees include Hewlett-Packard Co., Intel Corp., SAP AG and Digital Equipment Corp.

■ **ADSL blows into Windy City**

InterAccess Co. last week began offering the first commercially available Asymmetric Digital Subscriber Line (ADSL) service that gives multinegabit bandwidth over standard voice telephone lines — but it's expensive. Hardware costs about \$1,750, the installation costs \$1,000 and a 1.5M bit/sec link from the Internet costs \$1,000 per month. You can also link to a corporate network for \$1,000 per month. Availability is limited to within three miles of the intersection of Canal and Madison streets in downtown Chicago.

## Microsoft aims higher with Exchange

By Barb Cole

Austin, Texas

Microsoft Corp. has big plans to make its Exchange messaging system easier to deploy across large corporate networks.

The company sketched out an aggressive upgrade plan at its Exchange Deployment Conference here last week that includes two releases next year, following on the heels of the Internet-heavy Version 4.5, which is due by year-end.

The first 1997 release, which is expected to be called Version 5.0 and issued by midyear, will significantly improve the product's scalability, according to Greg Lobdell, group product manager for messaging and Internet services at Microsoft. It will boost the current 16G-byte storage limit on Exchange mailboxes to 16 terabytes and improve its support for Windows

NT clustering and symmetric multiprocessing hardware, he said.

The company will also add workflow enhancements to next year's releases. Basic hooks for



Kirk Reeves and Ned Studd, system administrators for the Kentucky Department of Education, will migrate about 25,000 Microsoft Mail users to Exchange.

workflow and interfaces for third-party authoring tools are planned for the early part of the year, to be followed in the second half with a server-based scripting engine and support for the cre-

ation of more complex workflow applications.

Despite Microsoft's effort to sketch out a long-term vision for Exchange, conference attendees were mostly interested in Version 4.5.

Microsoft is expected to officially announce it this week at NetWorld+Interop 96.

The new version will add support for Post Office Protocol 3, HTTP, Lightweight Directory Access Protocol and Net News Transfer Protocol. Internet Messaging Access Protocol 4 support is slated to begin beta testing around year-end, Lobdell said.

In addition, the new version will include Web Services, which means that end users can access their mailboxes and schedules from Exchange using Web browsers.

Previously, Microsoft offered  
*See Exchange, page 160*

## Notes faces Java-based upstart

*Sanga Pages, the first application environment to support JDBC database spec, also boasts database replication.*

By Ellen Messmer

Atlanta

Make way, Lotus Notes. Here comes Sanga Pages, the first Java-based development environment for creating workgroup applications that includes replication and access to corporate databases, the company claimed.

This week at NetWorld+Interop 96 here, start-up Sanga International Corp., based in Burlington, Mass., will launch Pages, the first Java-based application to take advantage of the Web-based database access standard, Java Database Connectivity (JDBC).

With JDBC, finalized by Sun Microsystems, Inc.'s JavaSoft division this March, a Java-enabled browser can access and update SQL-based corporate databases.

Sanga — which in the Buddhist tradition is a meditative healing group — wants to be a

company that fosters what Chief Executive Officer Shane Maine unabashedly calls "the spirit of pre-IBM Notes."

And if Sanga Pages looks like the Java reincarnation of Notes, well, that's not surprising, since Mark Luccier, once a Lotus project engineer and now Sanga's chief architect, designed it with Shane's twin brother, Shaun, Sanga's chief technology officer.

Bell Canada's Toronto-based Bell Sygma Systems Management division, which is beta-testing Pages, is getting into the Sanga spirit.

"Like Lotus Notes, I can replicate with Sanga Pages," said Wilby McKnight, a systems administrator who developed a Java-based trouble-ticketing system with Pages. "With the JDBC interfaces, we just point to a data-

base, and it's up. We can use Java applets to hook into any of our databases."

Java's much-ballyhooed platform independence lets McKnight write his Pages application once and run it on any of the Unix systems, VAXes, Linux workstations or PCs in his division. Pages includes a mail system that supports several protocols, including Post Office Protocol 3, Simple Mail Transfer Protocol, and Messaging Application Programming Interface.

Sanga Pages 1.0 also comes with Pages Form Design, a set of graphical user interface design components for custom applications or templates for data viewing. The Sanga product suite, available now, is being sold either as a \$995 Developer Kit or a \$1,795 bundled package called Intranet WebServer.

©Sanga: (617) 272-8500.

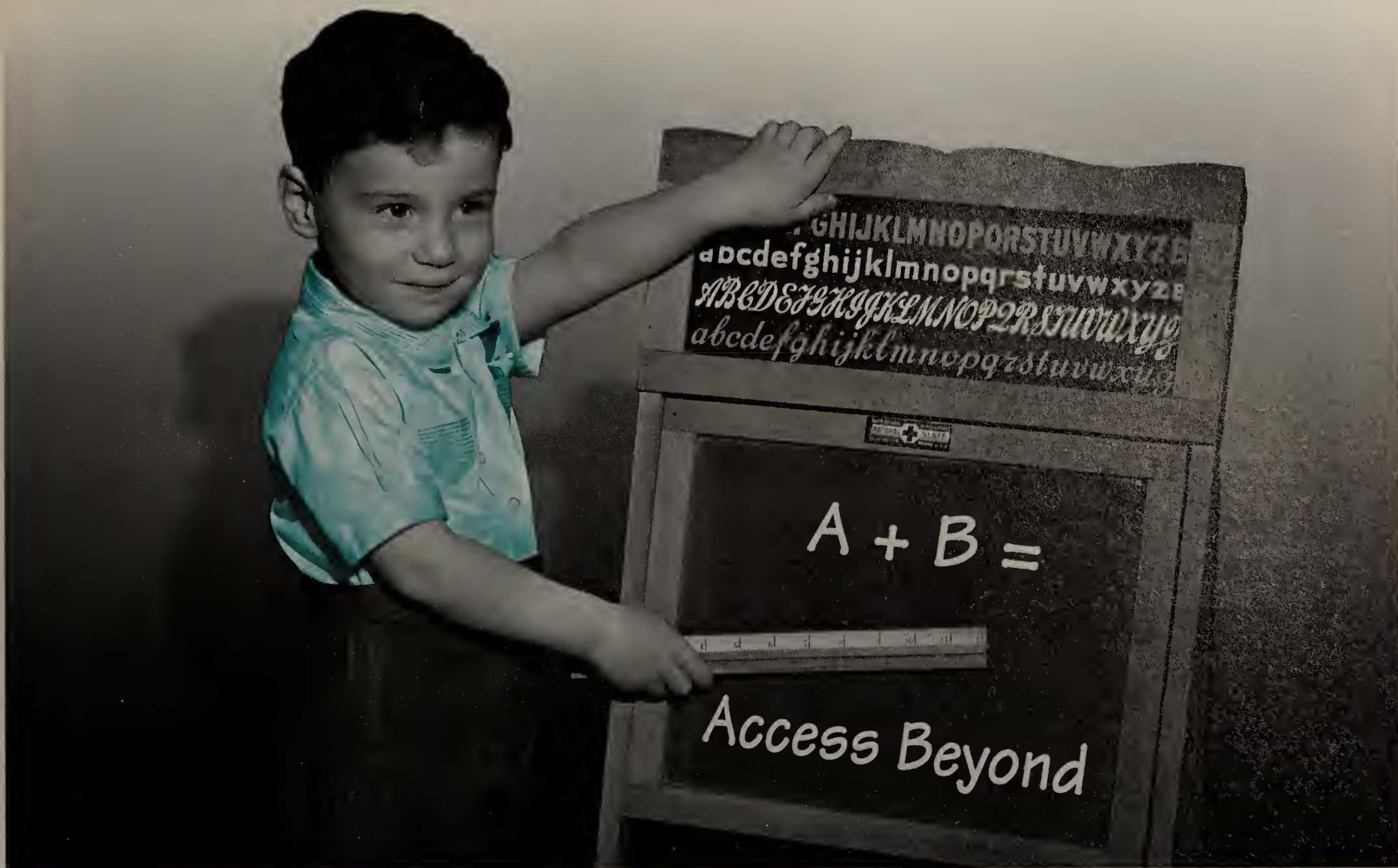


Identical twins, Shane (above) and Shaun Maine, this week introduced their Java-based workgroup product.

## HOW TO REACH US

**CALL:** (508) 875-6400; **FAX:** (508) 820-3467; **INTERNET:** nwnnews@nww.com; **WRITE:** Network World, 161 Worcester Rd., Framingham, MA 01701; **NETWORK HELP DESK:** Having trouble resolving a technical problem, locating resources or getting a vendor to follow up on a promise? Call (800) 622-1108, Ext. 451, or cnerney@nww.com; **SUBSCRIPTIONS:** nwcirc@nww.com; **REPRINTS:** In quantities of 500-10,000. Call (612) 582-3800. **BUYER'S GUIDE SURVEY REQUEST:** kscott@nww.com.





# Remote Access is as Simple as A/B... See?

## *Access Beyond Makes Remote Access Child's Play.*

Stop reading, 'riting and 'rithmetic, and start networking... with Access Beyond.

Access Beyond (A/B) is a new class of scaleable, modular remote access products built to make remote access simple. A/B products give you remote node, remote control and dial-out – all in one box. A/B provides multiple protocol support (IP, IPX, Appletalk) plus legacy access (Telnet, LAT), so your users need just one dial-in phone number to access the entire network. What's more, A/B auto-recognition and port setup for PPP make session start-up and negotiation completely transparent.



**A C C E S S  
B E Y O N D**

*Real Access, Real Easy*

1300 Quince Orchard Blvd., Gaithersburg, MD 20878, USA  
800-473-6745 or 301-921-8600

<http://www.accessbeyond.com>

United Kingdom: 3/64 Kingsclere Road, Basingstoke, RG 21 6XG, Phone: (44) 1256-817199 Fax: (44) 1256-817204

Even management, security and installation are childishy easy. Our Windows-based GUI lets you point and click unit settings, while SNMP lets you configure and monitor from anywhere on the net. A/B's internal username/password database makes security simple, even at small sites. Of course, for larger sites there's Bindery, TACACS, RADIUS, and SecureID. And everything comes pre-installed for out-of-the-box/into-the-network setup.

So, whether it's 4-ports, or 64, remote access truly *is* as easy as A/B. See for yourself, just call (800) 473-6745 for all the figures. Discover remote access that's in a class by itself. ***Access Beyond... real access, real easy.***

See us at  
**NETWORLD + INTEROP '96**  
Booth 856



# Conference mulls future of domain name system

By Chris Nerney  
Cambridge, Mass.

The rickety domain name system upon which the Internet currently is based will be crushed in the rapid commercialization of cyberspace, unless something is done — and soon.

The Internet leaders and experts who attended a conference at Harvard Uni-

Since 1993, registrations for names in all top-level domains — .com, .net, .org, .gov and .edu — have been handled by a private company, Network Solutions, Inc. (NSI) of Herndon, Va., for the National Science Foundation's Internet Network Information Center (InterNIC) project.

This agreement, argue many mem-

said Don Heath, president of the Internet Society (ISOC). "The Internet is so much bigger than .com or .net. This will facilitate growth."

While his draft does not actively address the deepening legal quagmire involving domain names and trademark rights, Postel has said the existence of business-related domains beyond .com could help avoid costly disputes and lawsuits by companies claiming infringement.

Critics of Postel's plan say that, at best, it naively ignores trademark issues and, at worst, would exacerbate them by introducing more points of conflict.

"Say there are three or four other top-level domain registries that start registering trademarked names. Instead of having one conflagration, you're going to have several," said Tony Rutkowski, vice president for Internet business development at General Magic, Inc. of Sunnyvale, Calif., and former executive director of ISOC, in an interview.

Rutkowski presented his own proposal to the Kennedy School conference, urging the merger of InterNIC and IANA into a nonprofit, narrowly tailored international body that would devise necessary procedures and domain name dispute resolution mechanisms.

Rutkowski and other critics even question IANA's authority to arbitrarily

revise the Domain Name Service (DNS).

Robert Shaw, adviser on global information infrastructure for the International Telecommunication Union (ITU) in Geneva, said the "legal foundation for a group like IANA to do this is a house of cards."

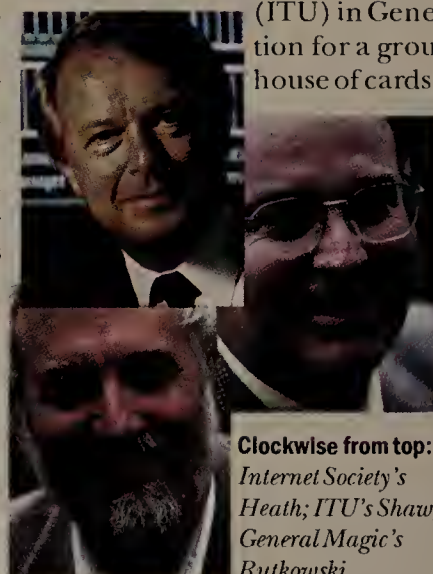
IANA's trustee role in the Internet community will not help the group withstand pressure from litigious corporations that do not care for Postel's plan. "The problem is that registries are a multimillion-dollar business," Shaw said. "Someone will challenge this." Shaw proposed to attendees away to capitalize on the

increasing market value of prestigious domains. "You could generate a tremendous amount of revenue by auctioning off top-level domains," he said.

Other attendees of the conference expressed concern that the endorsement of Postel's plan by ISOC made it a fait accompli. Heath reiterated that, despite the imminent formation of an ad hoc committee to process applications for new registries, "the IANA draft is a draft."

One panelist warned that efforts to sustain any kind of DNS as a 'Net directory invited perpetual legal problems.

"We're putting ourselves into the middle of a fight we don't need to be in," said Scott Bradner, a consultant with Harvard University's Office of Information Technology. "The longer we continue to go along on this tack that the DNS is the answer, the more fun the lawyers are going to have." ■

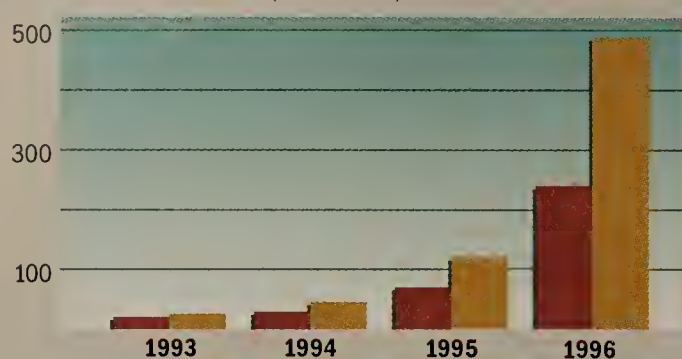


Clockwise from top: Internet Society's Heath; ITU's Shaw; General Magic's Rutkowski.

## THEY KEEP GROWING AND GROWING

Three years ago, the number of Internet domains increased by 5,000 from January to July. In the first six months of this year, the number of Internet domains increased by 248,000.

Total Internet domains (in thousands)



SOURCE: NETWORK WIZARDS, MENLO PARK, CALIF. (<http://www.nw.com>)

versity's Kennedy School of Government last week on the coordination and administration of the Internet almost universally agreed on that point.

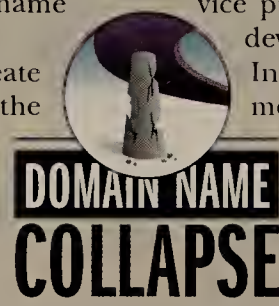
That, however, is where the consensus ended. In its place arose a sprawling, sometimes contentious, two-day debate fueled by a collective sense of urgency and a flurry of proposals for handling domain name allocation problems and legal challenges.

Last week's conference was dominated by a man who was not there — Jon Postel of the Internet Assigned Numbers Authority (IANA), whose recently announced plan to add top-level 'Net domains and award licenses to competing domain name registries was the reference point for virtually all discussion.

bers of the Internet community, has given a lucrative government-mandated monopoly to a company ill-equipped to handle the deluge of domain name requests (see graphic).

Postel's plan would create more top-level domains, with the new registries having exclusive rights to three each. As many as two dozen new registries could be licensed in the U.S., with a similar number abroad. Supporters of the Postel draft say competition in the top-level domain registration business will benefit the 'Net.

"Competition is good. Period. It generally lowers prices, it gives better service, and that's one of the objectives,"



## Seagate pulls together a suite for network enterprise management

By Michael Cooney

Seagate Technology, Inc. this week will meld its disparate products into a package it hopes will land squarely atop the client/server management heap.

Seagate Enterprise Architecture (SEA) is an object-based systems and network management framework from which will spring applications and services designed to ease the management of distributed net resources. SEA will integrate the products and technology the vendor has purchased from eight network, storage and sys-

tems management firms since 1995. These include software distribution, network and system backup, topology, net configuration, job scheduling and local storage management applications.

SEA will rely heavily on technology Seagate purchased from Calypso Software Systems, Inc. in May.

Calypso's Atrium and Maestro's products enable application monitoring, problem diagnosis and automated responses to application snafus, said Bob Quillin, vice president of product management for Seagate's

software division.

New applications such as a centralized database to store and access enterprisewide data will also be born from SEA.

"We are combining the myriad products we have for desktop and workgroup management with our enterprise management products to create a single

The company has bold plans for SEA products and expects to compete effectively with management heavyweights such as IBM/Tivoli and Computer Associates International, Inc. as well as Novell, Inc.

"Microsoft and others in this area don't have the variety of license management, software utilization and software distribution capabilities that Seagate will have all in one package," said Tim Wilson, a senior consultant with the Decisys, Inc. consultancy in Sterling, Va.

Seagate should also run into McAfee, which this week is introducing a suite of management applications focused on NT networks (see story, page 43).

SEA-enabled products will be available by year-end. Pricing was not disclosed.

©Seagate: (408) 342-4500.

### Seagate-worthy acquisitions

Company	Products	When acquired
Hollistic Systems	Information management	June 1996
Calypso Software Systems	Applications management	May 1996
OnDemand Software	Network management	April 1996
Arcada Holdings	Storage management	February 1996
Creative Interaction Technologies	Network management	May 1995
Frye Computer Systems	Network management	May 1995
NetLabs	Network management	March 1995
Network Computing	Network management	February 1995

SEA will include existing Seagate products as well, such as the Desktop Management Suite, which supports software distribution, virus protection and similar features.

framework for managing highly distributed servers, workgroups and clients," Quillin said. "We will be targeting Windows NT enterprises first, and other platforms will follow."



For that matter, the universe.  
Why? The universe may have  
an edge. Your network shouldn't.

Imagine an edgeless network unleashing  
boundless potential for people and  
information access. Luckily you don't have  
to. Sourcecom has broken the laws of  
physics so you can **experience** it.

We distilled networking down to  
its fundamental elements. Then we  
packaged it into the world's most  
compact, cost-effective and easy-  
to-use form. It's called InnerWare™  
and it is the key to building the  
edgeless Broadband networks  
for the next millennium.

Look for it! You may already  
be experiencing its power with  
your Broadband ADSL/HDSL or  
Cable modem—outfitting you with  
multi-megabit bandwidth for about  
the cost of your cellular phone and  
a basic phone bill. Or, it may be in  
your Web server, your access router,  
or even your Network Computer.  
InnerWare is Everywhere.

Get InnerWare into your networking  
appliance. Call us at 888-588-0555  
or visit us at our Web site,  
**[www.sourcecom.com](http://www.sourcecom.com)**.

Sourcecom. Erasing the Network Edge.™

## Don't Limit Yourself to Planet Earth



© 1996 Sourcecom Corporation.  
Sourcecom, InnerWare, and Erasing  
the Network Edge are trademarks  
of Sourcecom Corporation



# IBM turns up power, heats up networking on Big Iron

By Michael Cooney  
and James Niccolai

Boston

IBM last week announced mainframes that will perform better and deal more effectively with the Internet.

Among the enhancements to the System/390 server line are:

- A more fault-tolerant version of its TCP/IP for MVS package

- New system automation features

- Internet-ready applications and operating system software for its servers.

By most accounts, at least half of IBM's installed mainframes are running TCP/IP, so with that in mind, IBM continues to enhance TCP/IP for MVS with high-performance features. With Release 3.2, IBM has added support for high-performance native TCP/IP Sockets applications, as well as interfaces to link current DB2 and CICS transaction applications to TCP/IP net users.

IBM's new server lines include the S/390 Parallel Enterprise Server Generation 3 (S/390 G-3) and the S/390 Multiprise 2000, both of which are expected to be available in October, said Hermann Lamberti,

vice president of worldwide marketing for IBM's S/390 division.

Both server lines are powered by CMOS microprocessors, which IBM claims will save companies as much as 65% on operating costs, thanks largely to their air-cooling systems.

The S/390 G-3, geared toward larger businesses, is available with up to 10 processors and offers almost double the power of existing CMOS servers, Lamberti said.

To secure data transmission across the Internet and intranets, IBM announced two products, the Internet Connection Secure Server, featuring support for standards such as Secure Sockets Layer and Secure HTTP; and OS/390 Internet BonusPak II for deploying existing applications over the Web, and including secure Web browsers, Common Gateway Interface code and sample applications.

IBM will begin beta-testing Java support in the fourth quarter.

For more information, contact IBM at (914) 765-1900.

Niccolai is a correspondent at IDG News Service.



IBM's Lamberti says the new mainframes address scalability and network concerns.

# ATM network management gap filled

By Jim Duffy  
Reston, Va.

Out of the lab and onto the shelf.

Two years after it began testing an ATM network management application with the Air Force and Defense Information Systems Administration Agency (DISA), Stanford Telecommunications, Inc. is just about ready to shrink-wrap it for the rest of the world.

The software, called NetCoach, will provide an integrated view of the performance of an ATM network built with switches from multiple vendors. Most management packages from ATM switch vendors only work with a single vendor's offerings.

The distributed NetCoach application also includes an inference engine that not only makes it easier to ferret out the cause of a network problem but actually suggests remedial action.

Stanford Telecommunications (S-TEL) is currently hammering out deals with some of the industry's biggest players to bulk up NetCoach's multivendor capabilities and to have ATM switch vendors market the product. The vendors include Bay Networks, Inc., Cisco Systems, Inc., FORE Systems, Inc., General DataComm, Inc. and Newbridge Networks, Inc., said

Wayne Fuller, department manager at S-TEL.

At the very least, S-TEL hopes to announce the Fore arrangement at this week's NetWorld+Interop 96 show in Atlanta, Fuller said.

"These guys are getting beat around the face and eyes [by users, asking,] 'How do I manage it? How do I configure the virtual network and reconfigure it based on utilization?'" he said.

NetCoach runs on Hewlett-Packard Co.'s OpenView management platform under SunSoft, Inc.'s Solaris operating system.

As part of the switch vendor alliances, S-TEL gains access to the proprietary Management Information Bases (MIB) of those vendors switches. NetCoach translates MIB data into a common format and presents it on a Motif interface so users have a single management environment for a multivendor ATM network.

"When we were looking around for a network management capability that could work a mix of ATM switches, we found there weren't any," said Robert Sims, former director of the ARPA/DISA Joint Project Office (JPO). "S-TEL helped us out."

NetCoach is managing ARPA/DISA JPO's interconti-

mental T-3 ATM network that stretches from Hawaii to England and is built with Fore and Cisco LightStream switches, Sims said.

The NetCoach inference engine reads network performance data from NetCoach's Oracle Corp. database and uses predefined rules — such as dependencies between the Fore and Cisco switch components — to attempt to identify, correlate and diagnose failures and system degradations (NW, Sept. 12, 1994, page 1).

If degradation is detected, NetCoach's performance management capability can suggest network topology changes, including virtual network recon-

## Put me in, NetCoach

### Features of Stanford Telecommunications' NetCoach ATM management tool

- ▶ Proactive fault and performance management
- ▶ Consolidated support of heterogeneous environments
- ▶ Correlated alarms and trap messages
- ▶ Multiple-site management
- ▶ Guided network planning and resource allocation

figuration, to improve throughput and maintain service levels. This performance data can feed NetCoach's simulation engine, which models network activity so managers can balance switch workloads.

NetCoach's inference engine may actually turn out to be a disadvantage for the product because it could make it too pricey for off-the-shelf sale, observers said.

"You have a certain amount of artificial intelligence capabilities built into this product and that at least has connotations of being expensive and hard to maintain," said Jill Huntington-Lee, manager of new business development at SNMP Research International, Inc. "Some people might not consider the product because they have some concerns [about that]."

And even though NetCoach runs on the distributed version of OpenView — Release 4.1 — it does not use OpenView 4.1's distributed capabilities, Fuller said.

"The problem is it's oriented toward IP assets and it's [looking at] a subset of all information — the topology data," Fuller said. "We really need more flexibility than that."

NetCoach is priced from \$10,000 to \$40,000 and will be available next year. ■



# GigaLabs switch slides in under \$200 per port

By Jodi Cohen  
Atlanta

Start-up GigaLabs, Inc. will use NetWorld+Interop 96 here to show off a pair of protocol-independent switches that deliver gigabit throughput at Ethernet switching prices.

The company, which has its roots in the supercomputing industry, last week rolled out the GigaStar 100 workgroup switch that provides dedicated Ethernet to 128 end stations for less than \$200 per port. Also, GigaLabs is giving away its new GigaStar 2000 backbone chassis as a trial offer when customers buy \$15,000 worth of other equipment.

But price isn't the only interesting thing about the GigaLab gear, industry observers said. The highlight of the company's switches is its PCI-based GigaPipe technology for direct server connectivity at gigabit speeds. GigaPipe allows customers to

deliver big-time bandwidth to critical network resources, according to Kon Leong, president of GigaLabs.

When a GigaPipe connects to a standard PCI-based server, it extends the PCI channel, effectively importing the PCI bus into the switch itself, Leong explained.

"This is the first switch vendor that I've spoken with that really is looking at providing high-performance, low price-per-port switching capability that not only spans network standards like Ethernet, but also some very key I/O standards," said John Morency, principal at the Registry, Inc., a consultancy in Newton, Mass. "This is very unique."

The company's GigaStar 100 is a five-slot chassis for work-

groups or departments. It has a 1G bit/sec backplane and can support 32 switched, full-duplex Ethernet ports, as well as a choice of ATM, Fast Ethernet, FDDI or SCSI uplinks.

For the backbone, GigaLabs offers its GigaStar 2000 protocol-transparent LAN switch. The nine-slot chassis delivers 1.6G bit/sec bandwidth through each of its slots, for a total of 14.4G bit/sec switching capacity. The bandwidth from each 1.6G bit/sec slot can support four full-duplex 100M bit/sec Fast Ethernet connections, one ATM or FDDI uplink, or it can be cascaded to as many as 128 dedicated Ethernet desktop connections.

GigaLabs also plans to support token-ring and Gigabit



The GigaStar 2000 backbone nine-slot switch can support 1.6G bit/sec bandwidth per slot, for a total throughput of 14.4G bit/sec.



The GigaStar 100 workgroup switch includes ATM and Fast Ethernet uplinks as well as a 1.6G bit/sec fat pipe for linking to servers.

Ethernet interfaces by year-end. In addition, features such as virtual LANs and IP switching will be available next quarter.

Morency said he was also impressed by GigaLabs claim that the GigaStar 100 has a latency of about 750 nanoseconds. "I have not heard anybody quote a switching latency in that range.... That's incredibly low," he said.

Pricing for the GigaStar 100 chassis is \$1,595. The GigaStar 2000 switch lists for \$15,000, but is free for a limited time as an introductory offer. Also, GigaPipe is priced at \$1,995. All products will be available at the end of next month.

©GigaLabs: (800) 447-7498.



“

OKAY,  
SO THIS IS THE FUTURE  
OF THE ENTERPRISE.

”

High performance and upgrades  
accelerators High m  
also m  
new di  
for dis  
multi-processed & accelerators will  
High technology will  
make pos-  
a new  
l genera-  
for dis-  
ed appli-  
ns. We  
his 'digi-  
comput-  
and it  
be the  
ory most  
ificant  
technolo-  
novation  
for cus-  
ers as we  
each the  
of  
decade."  
computing  
ms direc-  
services  
be the Net  
k founda-  
for dis-  
ted com-  
ng sys-  
Work  
ons and  
use they  
enable a  
more logical linear  
to network implemen-  
tations directory ser-

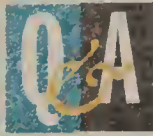
**"Directory Services will be the foundation for distributed computing systems. And because they will enable a new, more logical approach to network implementation and use, directories will have a dramatic impact for the better on the way networks are used and managed. They will also make possible a new generation for distributed applications. We call this 'directory-enabled computing', and it will be the most significant technology issue for customers as we approach the end of the decade."**

THE BURTON GROUP



# What's in store for FORE?

CEO Cooper addresses Gigabit Ethernet and other challenges ahead for the ATM leader.



Eric Cooper helped found ATM market leader FORE Systems, Inc. and, as the company's chief executive officer, is leading FORE as it faces the challenges of Gigabit Ethernet and other emerging technologies, as well as new competitors. *Network World* Senior Writer Jodi Cohen recently spoke with Cooper about FORE's plan of attack.

Some industry observers say the biggest threat to the major internetworking vendors right now is FORE taking over the ATM market. Do you think companies such as 3Com Corp. and Cabletron Systems, Inc. are supporting Gigabit Ethernet purely to stall ATM, allowing them to be more competitive?

I don't think so. Doing Gigabit Ethernet is a simple and, from a marketing point of view, attractive thing to do. It sounds like Ethernet. If you peek under the covers, it's not very much like Ethernet. I've read a number of customer quotes that say, "I'll deploy Gigabit Ethernet because I already understand Ethernet." Well, if they understood it, they would realize how different Gigabit Ethernet was. The ironic thing is that LAN emulation over



ATM is more compatible with Ethernet than Gigabit Ethernet is. People don't realize this because it doesn't have Ethernet in the name, but if you look at [ATM] at a technical level, it's true. It has the same frame formats, supports the right range of packet sizes, uses the same wiring.

FORE is just joining the Gigabit Ethernet Alliance, which now boasts more than 60 members. Will FORE wholeheartedly embrace the technology?

Embrace might be a strong word. Let's just say support. Our goal is to allow ATM to be integrated with the networks that customers have and are deploy-

ing now and in the future. If Gigabit Ethernet is one of the technologies that customers are deploying, then connecting Gigabit Ethernet to ATM will be part of FORE's future.

Gigabit Ethernet proponents question what benefit an ATM

## PAR FOR THE COURSE

When not in the office, Cooper enjoys spending time with his family and is also tackling the game of golf. Here's what Cooper had to say about his new hobby:

*"I'm trying to learn to play golf and I'm getting plenty of golf jokes about the name of the company, FORE. Actually, there's a golf company called Ping — a networking term — and so maybe we should switch names with them."*

backbone brings to an all-Ethernet LAN environment? How do you respond?

I would question whether you can build an all-Ethernet backbone. The technologies that have been put on the table — 100M and 1G bit/sec Ethernet — do not suffice to build an efficient, large-scale backbone network, simply because all they are talking about is bridging. And you can't build a backbone out of bridges. That war was fought 15 years ago. Some people claim that there is something magical coming that makes Gigabit Ethernet better. I'll believe it when I see it. ATM backbones will be the way people connect their Fast Ethernet switches and Gigabit Ethernet switches, if they are deployed.

You just mentioned ATM as a means of linking Ethernet switches. Does FORE still see switched and ATM LANs as complementary, or has that view changed somewhat since cutting ATM prices to compete with alternative technologies?

We still see LAN switching and ATM switching as complementary — in fact, now more than ever. It's clearer that most of our opportunities are in multiple-level switched-based networks. Those almost invariably include LAN switching integrated with ATM. The pricing moves that we've gone through have been consistent through our whole company history. We've lowered prices on ATM

connectivity year by year by 40% to 50%, and we're going to continue to do that. That's what you need to do if you have any hope of ATM becoming a mass-market technology.

Not long ago, FORE had the ATM market all to itself, but now lots of vendors have joined the market. Which competitors do you worry about most and why?

In the LAN space, our chief competitor is Cisco. It's partly because they have ATM product offerings, but far more importantly, it's because of Cisco's presence in that space across the board. Often, it's not their ATM products we're competing against, but rather their relationship with a customer, and they often try to delay or suggest alternatives to the deployment of ATM. 3Com and Bay have also invested in ATM, but FORE doesn't bump into them as often as we do Cisco.

The other main market segment for us is the WAN space, including sales to private wide-area networks as well as competitive access providers, Internet service providers and telcos. In this space, we not only offer our own ASX-1000 product, but also have a key partnership with Northern Telecom. Our strongest competitors are Cisco, through its acquisition of StrataCom, and Cascade. And to a lesser extent, we compete with Newbridge and General DataComm.

It seems like ATM management is going to be a big part of the technology's success. What is FORE's philosophy going forward on management? What are key issues here?

I agree. One of the benefits of ATM has to do with building networks that are significantly easier to operate and install than alternative technologies. It's already the case that they are slightly easier, but not as dramatically as I would like. One of the ways we can do that is through network management applications that take advantage of some of the unique characteristics of the underlying ATM technology.

Probably the most unique characteristic is the reliance on

virtual connections. Tools in our network management suite let you examine the top 10 most loaded connections and let you trace through the connectivity of a virtual circuit.

There is a lot of work being done in the area of multimedia over IP. How might that compare with ATM?

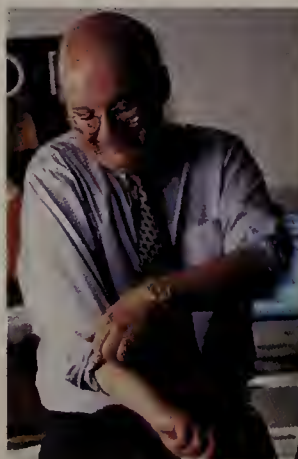
It's got different goals. You have to start from the point that IP's goal is to fundamentally



hide the heterogeneous nature of the underlying networks and to provide the best, but essentially lowest common denominator, service that can be provided over those networks. If you look at what the service model has been prior to the work on multimedia, it was best-effort data-gram service, or "send and pray," as some people describe it. It has very high reliability, but reliability that you had no way of influencing.

It's a real challenge to increase that service model to something better than best effort. But that's what this research effort is doing through [Resource Reservation Protocol], in particular. However, it's in an environment where there's no control over the underlying network. We see ATM as one of the few technologies that can deliver all the kinds of resources that RSVP can ask for.

People talk about ATM for transporting multimedia. Is this really happening, or what is it being used for?



It is really happening in the sense of transporting both traditional data traffic and traditional circuit traffic, like telephone calls between PBXs. That's one of the promises of ATM that we're now delivering on. The other way to look at the multimedia going over ATM is it's all data — some of which is video, etc. — and it's all done on top of traditional networking protocols, often IP.

What type of customers is FORE signing up these days, and how do they differ from your earliest customers?

It's a pretty marked difference. The kinds of customers we are signing today are by and large enterprise networks at the core of some portion of the key business of the customer. It may just be within one business unit or within one wing. If it is the design of the aircraft, then the engineers are now hooked up to an ATM-based network. The other characteristic is that almost uniformly they are using Ethernet switches to integrate ATM with their existing investment.

This is quite different from our early customers, who were often interested in ATM for its own sake or who wanted to do research in networking.

We had a market that was focused at the high end — power users, CAD workgroups — but then the connection to the rest of the organization would be low performance. Previously, the high-performance net was just in pockets. But now the backbone application has really taken off.

What ATM issues do you think the press needs to address?

One that I'm concerned over is the assumption that ATM is hard to understand or more complex than alternatives. These things all have to be understood in the context of what benefit you get for that. Even more importantly, who

## Bundling available here

The networkMCI One bundle of services is initially available in the following cities:

- |                   |                  |
|-------------------|------------------|
| ▶ Atlanta         | ▶ Milwaukee      |
| ▶ Baltimore       | ▶ New York       |
| ▶ Boston          | ▶ Philadelphia   |
| ▶ Chicago         | ▶ Pittsburgh     |
| ▶ Cleveland       | ▶ Portland, Ore. |
| ▶ Detroit         | ▶ Seattle        |
| ▶ Hartford, Conn. |                  |

pays the price of complexity? Is it the user or the vendor? If it's the vendor, then the user should be perfectly happy. It's another thing if the user has to deal with the more complex network. It's our mission to make sure that the user doesn't have to.

If that requires much more effort in software and silicon, so be it. Users shouldn't accept an inferior solution because it's simpler for the vendor to build. The Yugo was probably a simple car, and the Mercedes is more complex. But I know which one I'd rather drive. ■



"If you compare Windows NT Server to NetWare 4, then Novell has a significant advantage because of its centralized directory."  
Gartner Group's Dave Cappuccio

"NetWare 4's momentum is driven in part by customers' demand for NDS... NDS provides leading directory services for distributed networks."  
Lee Doyle, IDC

"The most complete directory service strategy... is Novell's... Novell is still 12+ months ahead of Microsoft..."  
META GROUP

OKAY, SO NOVELL®  
FOUND A FEW ANALYSTS WHO  
SHARE ITS VISION.

BUT THAT DOESN'T MEAN  
REAL WORLD CUSTOMERS WILL.

Most notably, NT Server lacks a comprehensive directory service. By contrast NetWare provides most of the capabilities necessary in a large-enterprise network operating system - especially in Novell Directory Services (NDS)."  
Gartner Group

"Novell is really positioning NDS as a specific Internet or client/server distributed set of products not tied to NetWare."  
LEE DOYLE, IDC



# Supercharged modems challenge ISDN

*Asymmetric capabilities match the requirements of Internet access data flow.*

By Tim Greene

As if ISDN didn't have enough trouble already, now analog modem makers are about to offer speeds to rival the struggling digital technology — but without the need to upgrade the phone line.

Vendors last week promised modems by mid-1997 that will give users 56K bit/sec speed in one direction. It will be slower upstream, but observers expect at least 14.4K bit/sec performance.

That approach parallels asymmetric digital subscriber line (ADSL), the budding broadband technology admired because its lopsided upstream/downstream capacities mirror the demands of Internet and corporate remote access. An asymmetric modem would be

similarly well suited.

"I'd love it," said Ron Murphy, vice president of information systems for CNL Group, Inc., a financial firm in Orlando, Fla., that uses 28.8K bit/sec modems for remote access.

"Now we send big files to people in the field on a disk. If we had that much more speed, it would make it more reasonable to send them on line," he said.

Boca Research and Hayes Microcomputer Products, Inc. both said they would produce 56K bit/sec modems based on new chips developed by Rockwell International Corp.'s Semiconductor Systems group. Analysts said they thought U.S. Robotics Corp. was working on a similar product, but the company would not confirm those reports.

## Cut the noise

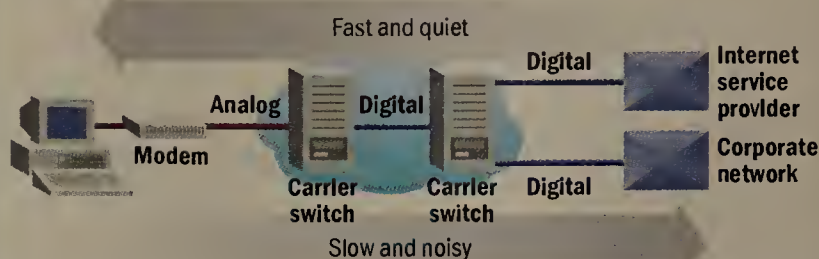
The new technology takes advantage of the fact that for most of its length, an analog

where it is digitized. If it is destined for a remote analog line, it is converted back to an analog signal at the central office nearest the receiving user.

However, if the receiving user has a digital connection to the carrier's network, the modem traffic is converted at only one

## MODEM MADNESS

New modems will be able to deliver 56K bit/sec downstream from a digital source. That's because that traffic is free of quantization noise introduced when an analog modem signal is made digital within the carrier network. Upstream traffic from an analog source is subject to the noise, so is slower.



modem connection is really digital. When an analog signal leaves the user's modem, it is carried to a phone company central office

place, where the analog line meets the central office. When the traffic is converted from analog to digital, noise is introduced

that cuts throughput. But the noise is less in the other direction, from digital to analog, allowing the greater downstream bandwidth.

## Not the end of ISDN

A fully digital ISDN Basic Rate Interface line offers up to 128K bit/sec in both directions, but the service is far more expensive than an analog phone line. Also, it is not universally available and can still be difficult to provision. Plus, most Internet service providers that provide ISDN connections only offer it for a single 64K bit/sec channel.

Rockwell said its new modem technology was not meant as a direct challenge to ISDN, but spokesmen for Hayes claimed it would act as a cheaper alternative. Other observers disagreed. "Will the ISDN market collapse? No. Will ISDN lose some users to this technology? Yes," said Sanjay Mewada, an analyst with The Yankee Group in Boston. ■

# MCI entices business customers with new services

*Systemhouse subsidiary launches LAN/WAN service.*

By David Rohde

Atlanta

MCI Communications Corp. last week introduced a service aimed at controlling the cost of computer network installation and maintenance for midsize businesses.

Office suite software.

MCI Systemhouse will then remotely manage the network down to the desktop from a dedicated net management center in Dallas.

Officials of the outsourcing division hope to tempt businesses to sign on for the services by offering an average price of \$2,700 per desktop per year. MCI compares that figure to the \$6,000 to \$12,000 per year that analysts have calculated as the average cost of maintaining a desktop in a LAN/WAN environment.

MCI Systemhouse will own and maintain the on-site network hardware, such as routers, hubs and servers. But the customer will buy its own PCs and pay for transport services from customer sites to the Dallas network management center.

Separately, MCI last week announced frame relay access to its MCI Mail and XChange 400 messaging services.

The goal is to give users with heavy messaging volumes a boost in the speed at which they can pull down their mail, according to Martha Hanlon, MCI's director of messaging marketing.

©MCI: (800) 338-6815.

*MCI bundles local, long-distance business services, but frame relay, SMDS not included.*

By David Rohde

Washington, D.C.

MCI Communications Corp. took the initiative last week in bundled local and long-distance services for big business customers by announcing an industrial-strength version of its MCI One offering for consumers and smaller businesses.

## Bundling available here

The networkMCI One bundle of services is initially available in the following cities:

- ▶ Atlanta
- ▶ Baltimore
- ▶ Boston
- ▶ Chicago
- ▶ Cleveland
- ▶ Detroit
- ▶ Hartford, Conn.
- ▶ Milwaukee
- ▶ New York
- ▶ Philadelphia
- ▶ Pittsburgh
- ▶ Portland, Ore.
- ▶ Seattle

The new offering, dubbed networkMCI One, combines long-distance voice and data services with new local service offerings from MCI. This will provide corporate customers with potentially bigger volume discounts.

But with MCI pricing some services off a price schedule submitted to the Federal Communications Commission last Friday, it was unclear at press time whether customers can expect big savings from networkMCI One.

User attorney Ellen Block

cautioned that carrier bundles are not for everyone.

"Sophisticated users tend not to want to be tied to an individual vendor," said Block, a partner in the Washington, D.C. law firm of Levine, Blazsak, Block and Boothby. "On the other hand, there are some people who appreciate the no-brainer aspect of that package."

Included in the package are voice services such as Vnet, Vision and 800 offerings, data services such as private-line, switched digital and inter-

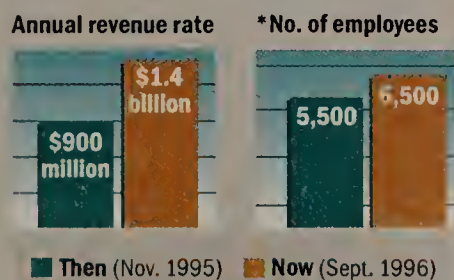
netMCI, plus MCI Mail and conferencing services.

In addition, it includes typically expensive dedicated access services that link customer premises to MCI points of presence.

Although subsidiary MCI Metro has installed local telephone switches in 13 cities, most MCI local service customers must still purchase dedicated access lines because the carrier lacks adequate interconnection agreements with regional Bell operating companies. ■

## ON A GROWTH PATH

The former SHL Systemhouse — now renamed MCI Systemhouse — claims the following growth since its Nov. 1995 purchase by MCI:



\*Employee figures include on-site data center personnel for companies that completely outsource their IT operations to MCI Systemhouse.

The carrier's newly renamed subsidiary MCI Systemhouse launched networkMCI Enterprise Management, a one-size-fits-all outsourcing and remote management service for businesses with 50 to 1,000 desktop computers.

Under the service, MCI Systemhouse will go to a customer's site and install a standard LAN and WAN architecture based on Compaq Computer Corp. ProLiant servers, Cisco Systems, Inc. routers and Microsoft Corp.

## User Excellence Awards: It's crunch time

Don't miss out on your chance to get the recognition you deserve.

Network World's User Excellence Award recognizes organizations that effectively use network technology to gain a competitive edge. You'll have a shot at this year's top honors if you just take a few minutes to explain in simple terms what key network projects you've implemented and how they relate to your organization's bottom line.

Winners will be honored in an awards ceremony at the ComNet show in Washington, D.C. in February and will be featured in our special year-end Power Players issue. **Winners will also receive certificates good for up to 10 Network World seminars, intended to help ensure your staff stays ahead of the game.**

E-mail your entry to [excellence@nww.com](mailto:excellence@nww.com) or fax it to (508) 820-1103. Be sure to include your name, title, company name, address and phone number. The deadline has been extended to Sept. 23. Please note: Entries will be accepted only from user organizations; no vendors or consultants, please.





compu they w  
"It's simp with NDS,  
the network does the-  
work. Without NDS,  
I do the work."  
ERIC GORDEN  
SENIOR SOFTWARE  
ENGINEER  
TOUR ICE INC.

NIRAJ PATEL  
CHIEF TECHNOLOGY  
OFFICER  
GNAC MORTGAGE  
"For our purposes, we  
needed one place for all  
the network information.  
We went to NetWare  
because of NDS. It  
to have a central ND  
to do all of the mana

Log digital computing, and  
most significant high tech innovations we near the next  
"NDS allows us to manage large or small network  
environments much easier and faster from a single  
console due to its network-centric design."  
J. DOUGLAS CROWDER,  
VICE PRESIDENT & NETWORK ARCHITECT,  
INTEROPERABILITY SOLUTIONS GROUP,  
TUSCON, AZ

"NDS has definite  
really saved a o  
time and heada s."

BOB HANSON  
SYSTEMS SUPPORT ANALYST  
GENERAL NUTRITION  
CORPORATION

Oh.

MIKAELE RACINE,  
MANAGER OF CLIENT SERVER  
TECHNICAL SUPPORT  
ROHN AND HAAS COMPANY  
Novell Directory Services makes  
our global 10,000 node network to  
look like one enterprise LAN.  
Standardizing on NetWare 4 as our  
NOS made our global migration  
easy to plan, roll out, and manage.  
We gained immediate benefits from  
NDS when we installed it at the first  
of our 80 sites and we continue to  
leverage it. Our businesses now  
have better access and control of  
their data. NDS allows us to admin-  
ister our LAN today from any desk-  
top with fewer people. We have  
found NDS to be robust and stable.  
Basically, NetWare 4 works!"

Novell Directory Service. I can  
now create objects or users,  
log-in scripts, passwords,  
etc. from one location. With  
servers all over the  
I have the ability  
rights to people  
they are. No do  
it, this has made  
much simpler."

TODD PENNINGTON  
ITS MANAGER  
LEGAL COPIES INTERNATIONAL

enables our  
to access  
information and  
resources across  
the enterprise with  
a single log-in."

DENNIS OLSON  
SENIOR NETWORK  
SYSTEMS ANALYST  
ROCKWELL AUTOMATION  
ALLEN-BRADLEY

"At Lawrenceville, it's critical  
for us to assign unique access  
privileges to each group of  
students, faculty, and staff -  
more than 1,000 users. With  
NDS, that task is simple and  
straightforward. It's one thing  
we don't have to worry about."

Susan Riederer  
Chief Information Officer  
The Lawrence School  
Lawrenceville, New Jersey

"NDS is it  
easy to manage  
and maintain the  
network from an  
administrator's  
standpoint and  
it allows users  
to log-in once  
to access all  
the resources on  
the network."

KEVIN PUENT, SENIOR  
NETWORK ADMINISTRATOR,  
NORTEL COMMUNICATIONS  
SYSTEMS WEST

"NDS allows  
age this system more  
efficiently because now  
users are able to get to  
the applications no mat-  
ter where they are."

DON RAMSEY  
INFORMATION  
TECHNOLOGY ARCHITECT  
CHILDREN'S MEDICAL  
CENTER OF DALLAS

Like to see even more proof of Novell's superiority? Call us at 1-800-219-1700  
to receive our Novell Directory Services™ Test Drive CD-ROM. Or visit us at  
[www.novell.com/nds](http://www.novell.com/nds). You'll be impressed. And you can quote us on that.

Novell Directory  
Services™

Novell®  
Everything's Connected™



# IBM leads electronic commerce crusade at ICE

By Joanie Wexler

Anaheim, Calif.

It was evident at last week's Internet Commerce Expo (ICE) here that vendors are buckling down to enable secure electronic selling.

IBM led the ICE contingent with a partnership program that has the potential to

speed education about commerce technologies and hasten delivery of electronic commerce to the merchant masses.

BBN Planet announced a secure transaction processing service called Merchant Advantage, based on transaction processing software from OpenMarket, and Best Internet demonstrated its recently

announced transaction processing service (NW, Sept. 9, page 39).

For its part, Silicon Graphics, Inc. announced a series of electronic commerce partnerships with key technology providers such as CyberCash, Inc., Open Market, Inc. and BroadVision, Inc. SGI will deliver their security and commerce

products with its packaged Internet server offerings.

IBM's partnership program probably made the biggest step last week in moving the World-Wide Web beyond marketing and information sharing. The company followed the launch of its CommercePoint application software portfolio (NW, Sept. 9, page 78)

with the announcement of the IBM CommercePoint Partnership.

Through the program, IBM will provide consulting and training on CommercePoint applications and tools to value-added resellers, Web design firms, marketing companies and others.

Those companies can then help their own merchant customers deploy customized adaptations of the IBM software to foster Web-based sales.

"By supplying customers like [value-added resellers] and integrators with assistance, IBM will help everyone along the [electronic commerce] learning curve," said Tom Jenkins, broadband consultant at TeleChoice, Inc., a consulting firm based in Verona, N.J.

For example, a newly formed non-profit group at KPMG Peat Marwick LLP is using IBM CommercePoint technology to develop standards for buying and sell-



## Need to Learn About VLANs and LAN Switching and ATM Switching? Cool.

**Free VLAN Seminar.**  
**Free 200-Page Switching Book.**  
**Best of All: Free Tote Bag.**

### Who is Xylan?

**Powerful LAN Switching.** Ethernet, token ring, FDDI, CDDI, Fast Ethernet, ATM uplinks, frame relay.

**Comprehensive VLANs.** The most flexible, comprehensive, manageable VLAN toolkit available.

**Switching + Routing.** Any-to-any switching at layer two, IP and IPX routing at layer three.

**Advanced ATM Switching.** Up to 128 25M ports, up to 64 OC-3 ports, up to 16 OC-12 ports, across a 13.2 Gbps cell matrix (Q4 1996).

**Flexible NMS.** Graphical network management on Windows, Unix, OpenView, SunNet, and NetView for AIX.

**Incredible Processing Power.** Up to 17 RISC processors and 40 ASICs in each switch.

**Major Worldwide Vendor.** Over 40 support and sales offices in 15 countries.

For seminar details, and to reserve your place:  
Call us at (800) 932-0024.  
Or call us at (818) 878-4888  
Or check our Web site at <http://www.xylan.com>.

### Seminar Dates

#### USA

August	27	Detroit
August	28	Milwaukee
August	29	Minneapolis
September	10	Montreal
September	24	Hartford
September	25	Pittsburgh
September	26	Cincinnati
October	1	Philadelphia
October	2	Baltimore
October	3	Charlotte
October	8	New York
October	9	Ottawa
October	10	Calgary
October	15	Iselin/Edison
October	16	Boston
October	17	Washington DC
October	22	Kansas City
October	23	St. Louis
October	24	Chicago
October	29	Salt Lake City
October	30	Denver
October	31	San Antonio
November	5	New Orleans
November	6	Dallas
November	7	Houston
November	12	Atlanta
November	13	Tampa
November	14	Miami
November	19	San Francisco
November	20	Bellevue
November	21	Vancouver
December	3	Scottsdale
December	4	Albuquerque
December	10	San Diego
December	11	Newport Beach

#### EUROPE

August	22	Helsinki
August	28	Germany
September	10	Germany
September	11	Germany
September	12	Germany
September	16	Germany
September	17	Germany
September	18	Germany
September	23	London
September	24	Amsterdam
September	26	London
October	2	South Africa
October	3	South Africa
October	4	South Africa
October	16	Paris
October	17	Milan
October	22	Stockholm
October	23	Frankfurt
October	24	Munich
October	25	Madrid

#### ASIA-PACIFIC

September	2	Taiwan
September	4	Singapore
September	6	Indonesia
September	9	Philippines
September	10	Malaysia
September	12	Thailand
September	16	India
September	18	Hong Kong



XYLAN

Complete Switching Systems for  
the Next Generation of Computing

XYLAN CORPORATION 26679 WEST AGOURA ROAD, CALABASAS, CA 91302-1900



IBM's John Patrick talks up electronic commerce.

ing software over the 'Net, said Douglas Graham, a director at KPMG in New York.

Another IBM partner, Leopard Communications in Boulder, Colo., is piloting IBM's World Distributor business-to-business commerce software, due in the fourth quarter. Leopard will use IBM tools and consulting to launch electronic catalogs for its client, the National Association of Wholesalers. And the Unibex Global Alliance, a young provider of international electronic commerce services for small to midsize businesses, said it will use CommercePoint technologies to enable domestic and international 'Net trade.

IBM is bullish on electronic commerce's potential to quickly kick into gear. "The home page is dead," stated John Patrick, vice president of Internet technology at IBM. "Live, interactive Web sites are in."


Still, the electronic commerce vendors at ICE admit it will be at least another six months before ordering, transaction processing and fulfillment begin catching on over the Web. Even the L.L. Bean Web catalog on display in IBM's booth allowed only browsing; actual ordering will not be available through that page until the first quarter of next year. ■





## YOUR CONNECTION TO FREE NETWORK PRODUCTS.

Find out how to take advantage of our leading-edge switching solutions and limited-time offers, free with purchase.

Call 1-800-859-1758, or mail this card today. 

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Type of Business \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone (    ) \_\_\_\_\_

E-mail address \_\_\_\_\_

**digital**™

ANM-3





NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**  
FIRST-CLASS MAIL PERMIT NO 79 WESTFORD MA

POSTAGE WILL BE PAID BY ADDRESSEE



DIGITAL EQUIPMENT CORPORATION  
PO BOX 687  
WESTFORD MA 01886-9902





# WE ONLY BUILD SWITCHES FOR THE REALLY IMPORTANT NETWORK TECHNOLOGIES: NAMELY, ALL OF THEM.

*In networking, "and" is*

*a vastly more powerful notion than*

*"or." Which is why*

*Digital offers switching solutions for*

*Ethernet and*

*FDDI, ATM and IP. A*

*comprehensive family of price/performance*

*leading switches, including the world's fastest*

*FDDI and IP Switches—for secure, high-*

*speed network or Internet access. Digital*

*switches are*

**DIGITAL  
NETWORKS**

*flexible,*

*modular and scalable from desktop to*

*enterprise. And backed by an unmatched*

*worldwide ~~en~~enVISON™ service and*

*support system. See your Digital Business*

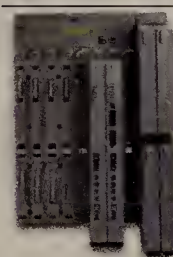
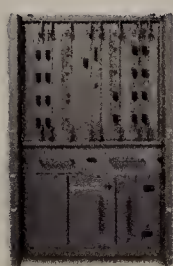
*Partner, call 1-800-457-8211 or visit*

**digital**

™ [www.networks.digital.com](http://www.networks.digital.com),

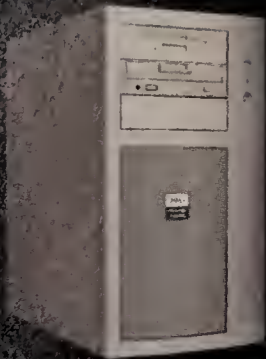
**WHATEVER IT TAKES**™ *for switches designed around the*

*most powerful technology of all: the power of choice.*



*Digital switches are  
equally at home in stand-  
alone, rack-mount or  
chassis configurations.  
And each is a part of  
enVISON: Digital's  
comprehensive road  
map to the virtual  
networking of the future.*





Introducing the  
PowerEdge 2100:  
Redefining the  
entry-level server.

# Investment Banks Jump On Public Offering Of Dell Servers

## 3 of 4 Top Firms Report Improved Network Performance

Wall Street may be feeling a bit queasy, but it's definitely a bull market for Dell. The Austin, Texas-based computer maker has scored a bit hit among some of the largest investment banks with - of all things - its line of PowerEdge servers.

"It might seem surprising," said one source. "When people think of Dell, they think of desktops and portables. But Dell's adherence to open network standards makes their servers a natural on large corporate networks."

It also makes Dell unusual among its competitors, most of whom are only now beginning to abandon their proprietary standards in favor of a more open approach. "I don't want to name names, but companies like Compaq and HP are





The following could be considered insider information. Run with it.

- Dell is ranked fifth in US server market share
- Dell servers are built in a dedicated ISO 9002 server factory
- Mission-critical server support is provided 7 x 24
- 5 of the top 6 software makers buy Dell servers
- 5 of the 6 largest automobile makers buy Dell

- 4 of the 5 largest mutual insurance companies buy Dell
- 5 of the Big Six accounting firms buy Dell
- 92% of Dell's \$5.8 billion revenues come from businesses and government agencies

**DELL® POWEREDGE® XL 5166-2**

TWO 166MHz PENTIUM® PROCESSORS  
(Expandable to Quad Processor)

- 256MB ECC RAM
- Three 4GB Fast/Wide SCSI-2 Hard Drives
- 512KB Write Back Cache
- 15TX Monitor (13.7" v.i.s., .26NI)
- Mylex RAID Controller
- Intel® Pro 100 PCI Ethernet Adapter
- 6X SCSI CD-ROM
- 4/8GB DAT Tape Back-up
- SafeSite™ Server Management System
- On-site\* Setup and Validation
- 4 Hour BusinessCare™ Warranty\* (5 x 10)
- 1 Year DirectLine™ NOS Support

**\$25,394**

Product Code: #200132

**DELL® POWEREDGE SP 5166**

166MHz PENTIUM PROCESSOR  
(Expandable to Dual Processor)

- 64MB ECC RAM
- Three 2GB SCSI Hard Drives
- 512KB Write Back Cache
- 15LS Monitor (13.7" v.i.s., .28NI)
- Dell SCSI Array RAID Controller
- 3Com® PCI 10/100 Ethernet Adapter
- 6X SCSI CD-ROM
- SafeSite Server Management System
- 3 Year BusinessCare Warranty\*
- 1 Year DirectLine NOS Support

**\$11,566**

Product Code: #200133

**DELL® POWEREDGE 2100**

200MHz PENTIUM PRO PROCESSOR

- 128MB ECC RAM
- Two 4GB 7200 Fast/Wide Hard Drives
- 256KB L2 Cache
- 3Com PCI 10/100 Ethernet Adapter
- 8X SCSI CD-ROM
- Intel LANDesk Server Manager v2.5x
- 3 Year BusinessCare Warranty
- 1 Year DirectLine NOS Support

**PICTURED SYSTEM**

**\$6997\***

Product Code: #200148

**DELL® POWEREDGE 2100**

180MHz PENTIUM PRO PROCESSOR

- 64MB ECC RAM
- 4GB 7200 Fast/Wide Hard Drive
- 256KB L2 Cache
- 3Com PCI 10/100 Ethernet Adapter
- 8X SCSI CD-ROM
- Intel LANDesk Server Manager v2.5x
- 3 Year BusinessCare Warranty
- 1 Year DirectLine NOS Support

**PICTURED SYSTEM**

**\$4897\***

Product Code: #200147

At no extra charge, get Microsoft® Windows NT® Server in the package or pre-installed on your hard drive with each server you buy. Offer ends 9/30/96.

**DELL®**  
**800-873-1450**  
<http://www.dell.com>

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm  
In Canada,\* call 800-839-0148

Keycode #29024





# CASCADE REMOTE ACCESS. NEVER LEAVES YOU STRANDED.

The explosive growth of the Internet has created an enormous demand for dial access ports in the public network. Don't let scalability limitations leave you stranded. It's a new world driven by a new set of customer access requirements. To stay ahead, you need an access solution that scales far beyond current offerings. With Cascade's carrier-class Remote Access products you are ready for whatever opportunity comes your way. Our high capacity access switches are built with the same level of scalability, performance, availability and management that our customers have come to expect. A world leader in Frame Relay

and ATM, Cascade delivers its carrier-class expertise to Remote Access to help you overcome the limitations that make the expansion of the Internet difficult and expensive. Already at the heart of the Internet, Cascade now brings scalability and QoS right to the network edge.

To learn more about Cascade's Remote Access solutions, call for our free brochure – *The AX Family of High-Capacity Access Switches* at 1-800-647-6926 or 1-617-542-0714. Or visit our Web site at <http://www.casc.com/access>.



**Setting the Pace in Carrier-Class ATM, Frame Relay and Remote Access.**

USA: 1-800-647-6926 EUROPE: +44-1628-828500 JAPAN: +81-3-3798-5181 CANADA: 905-470-8644 SPAIN: +34-1-345-7276 GERMANY: +49-6172-925858 SINGAPORE: +65-435-0414 LATIN AMERICA: 954-450-9922  
Cascade Communications Corp., 5 Carlisle Road, Westford, MA 01886 USA. Phone: 508-692-2600, Fax: 508-692-5052, Email: [mktg@casc.com](mailto:mktg@casc.com)  
The Cascade logo is a trademark of Cascade Communications Corp. All other trademarks are the properties of their respective companies.



# WANs & Internetworking

**Covering:** Network Architectures and Management • Routers • Muxes, Remote Access Gear, Modems, PBXs and other CPE • Mobile Computing Products

## Briefs

■ **FlowPoint, Inc.** has announced enhancements to its **ISDN** bridge/router product line, including the addition of **IPX** as a standard feature on all models and price reductions across most models. The company has also lowered the prices of several FlowPoint-100 models by as much as \$200. The enhanced, less costly FlowPoint routers are available now.  
FlowPoint: (408) 252-6740.

■ **U.S. Robotics** this week at NetWorld+Interop 96 will introduce the NetServer/8 and NetServer/16 I-modem remote access servers that can



accept either analog or ISDN calls on any port. The products are intended for users migrating toward ISDN but who do not want to invest in ISDN for all remote locations. The devices support remote management, IP and IPX, and Multilink PPP. NetServer/8 costs \$8,995, and NetServer/16 costs \$13,995.  
U.S. Robotics: (800) 877-2677.

■ **ADC Kentrox** announced that it has added analog access to its Pacesetter **ISDN** home office router line with the Pacesetter SOHO, allowing use of the line for voice calls, fax or analog modems. SOHO includes one ISDN Basic Rate Interface line, two analog phone ports and a four-port Ethernet hub. SOHO will be available next month for \$995.

ADC Kentrox will also introduce MagnumPlus, its new broadband access multiplexer that integrates voice, video and data onto T-3/E-3 or OC-3 Synchronous Optical Network (SONET) or time-division multiplexed backbones.

MagnumPlus will also be available next month for the price of \$10,000.

ADC Kentrox: (503) 643-1681.

## Remote access

### RAScom opens for third-party business

By Tim Greene  
Salem, N.H.

Start-up RAScom, Inc. will introduce at NetWorld+Interop 96 an open-standard ISDN remote access server that takes advantage of declining PC prices and off-the-shelf technology.

RAServer 2000 and RAServer 2500 are Intel Pentium-based servers that support user interface cards from other vendors, including 3Com Corp., Fore Systems, Inc. and Madge Networks, Inc.

That architecture is meant to make it cheaper and easier to  
See RAScom, page 29



### Racal adds to scads of FRADs

By Michael Cooney  
Sunrise, Fla.

Racal Datacom, Inc. hopes to cut through the noise in the crowded frame relay access device (FRAD) market with products that promise to improve remote branch office network availability and performance.

In its first FRAD foray, the company will roll out its FastFrame family of FRADs designed to give users guaranteed delivery of SNA traffic from remote branch offices over frame relay nets. At the same time, the tools are designed to allow administrators to more easily control bandwidth and prioritize mixed LAN and SNA traffic.

The company is attempting to break into a market that has seen an explosion of competition in the past year. Big guns such as Cisco Systems, Inc., Motorola, Inc. and Bay Networks, Inc., along with smaller companies like Jupiter Technology Corp., have all entered the FRAD ring.

"One of the biggest challenges Racal and many of the other FRAD vendors face is differentiating themselves with a technology that really doesn't lend itself to too much differentiation," said Thomas Nolle, presi-



dent of CIMI Corp., a consultancy in Voorhees, N.J.

Racal expects to use its redundancy and network management features to differentiate its devices, said Nat Parke, general manager of Racal's program office. "Our strategy is to make it

almost impossible for users to lose mission-critical applications to network failures," Parke said.

The FastFrame family includes three members: Models 200, 300 and 600. The Model 200 is the low-end feeder FRAD and supports two ports for local SNA, bisynchronous and other legacy protocol traffic, as well as two WAN ports at speeds up to 64K bit/sec. It is designed for remote branch applications where there are no LANs, such as automated teller machines.

The Model 300 supports two local ports for SNA and other legacy traffic, a single Ethernet or token-ring LAN port and two WAN ports at speeds up to 128K bit/sec. The high-end central-site FRAD, the Model 600, supports four local SNA traffic ports, one token ring or Ethernet LAN, and two WAN ports at speeds as fast as T-1.

The FastFrame family supports a slew of SNA protocols, including bisynchronous and 3270. It also has other features, such as Synchronous Data Link Control to Logical Link Control 2 conversion so users can terminate that traffic locally and keep it off the backbone.

### IBM wants to store the 'Net

By Michael Cooney  
San Jose, Calif.

IBM last week rolled out its first storage system targeted at Internet and intranet users, but it ain't cheap.

The company announced the 3466 Network Storage Manager, a single integrated hardware and software package for

144G bytes of regular data from servers and desktop systems. The data can come from across enterprise internetworks or via the public Internet.

The idea is to preconfigure a package that reduces the complexity of storage systems for distributed environments, said Nora Denzel, director of Storage Management Software in IBM's Storage Systems Division. The package's primary applications will be to support automatic backup and retrieval and disaster recovery.

IBM said the 3466 will help users decrease the costs of ongoing storage management. IBM said because all the components of the RISC-based 3466 have been preconfigured and tested, users do not have to evaluate the new box before installation. The package will also reduce costs by allowing users to better schedule the automatic backup of critical servers and workstations across the enterprise.

The 3466 comes with IBM's WebShell interface that supports Internet browsers such as Netscape Communications Corp.'s Navigator, Microsoft Corp.'s Internet Explorer or IBM's Web Explorer. This allows users to backup and restore their files through the public Internet or corporate intranets.

The package supports various client/server operating systems, including IBM's AIX and OS/2, Digital Equipment Corp.'s Unix, Hewlett-Packard Co.'s HP-UX, Novell, Inc.'s NetWare and Microsoft's Windows NT. It also supports a variety of database applications, such as IBM DB2, Oracle, Lotus Notes and SAP R3.

The Network Storage Manager comprises IBM's Serial Storage Architecture storage disks, a Magstar 3590 Tape Drive and ADSTAR Distributed Storage Manager (ADSM) software. ADSM controls the flow, backup and archiving for the data that the 3466 handles. For connectivity, the box supports token ring, Ethernet and FDDI LANs and TCP/IP, SNA/LU 6.2, NETBIOS and IPX protocols.

The 3466 should be available by the fourth quarter.

©IBM: (800) 426-2255.

#### SNAPSHOT OF CLIENTS AND DATABASE APPS SUPPORTED BY IBM'S NEW STORAGE MANAGER:

Clients supported	Database applications from
Apple Macintosh	Oracle
Bull BOS/X, DPX/2	IBM
Digital Unix, VMS	Sybase
HP-UX	Lotus
IBM AIX, OS/2	SAP
MVS OpenEdition	
Microsoft Windows, NT, 95	
NCR Unix	
Novell NetWare	
SunOS/Solaris	

data backup, retrieval and storage. Pricing will start at \$480,000.

The system can store up to 40 terabytes of compressed and

See what other FRAD vendors are up to.



Type the number above in the DocFinder box on the home page.



All FastFrame software includes bandwidth allocation and traffic prioritization mechanisms that ensure response-time-sensitive SNA application data continues to flow over a congested frame relay link, Parke said.

It is also in the software where the important redundancy features are supported, Parke said. For example, an Automatic Dial Restoral feature detects the loss of a leased line and redials the switch using the same Data Link Connection Identifiers to restore the connection. If the  
See Racal, page 29



*Remember the thrill you got the first time you were in complete control?*



OS/2 and OS/400 are trademarks of Tivoli Systems, Inc. OS/2, OS/400, MVS and PS/3 are registered trademarks of International Business Machines Corporation. Windows and Windows NT are trademarks of Microsoft Corporation. NetWare is a registered trademark in the United States and other countries, licensed exclusively through X-OPEN Company Limited. NetWare is a trademark of Novell, Inc. © 1996 Tivoli Systems Inc.





## *The feeling's back.*

*Sure you were nervous when you got behind the wheel, but once you got the hang of it, barreling that baby round the track put you on top of the world.*

*Today, you're trying to manage something that's a lot more complicated. A network computing environment that includes mainframes, servers and desktops scattered all over the planet. You need a management solution. A smart one.*

*Maybe that's why so many companies are relying on us to bring order to the way they do business. Which is what Tivoli TME 10™ is all about. Because it's the only mainframe-to-desktop management solution that's highly scalable, truly open and capable of operating transparently across all major platforms (including the most popular versions of UNIX®, NetWare®, Windows®, Windows NT®, MVS®, OS/2®, and OS/400®). Plus, with Tivoli Manager for Applications, it's the one and only proven environment for mission-critical applications management.*

*And now, with all the worldwide resources of IBM® behind us, we also deliver unmatched service and support wherever you do business.*

*So, if you're ready to get back in complete control, give us a call. We can put you behind the wheel again.*

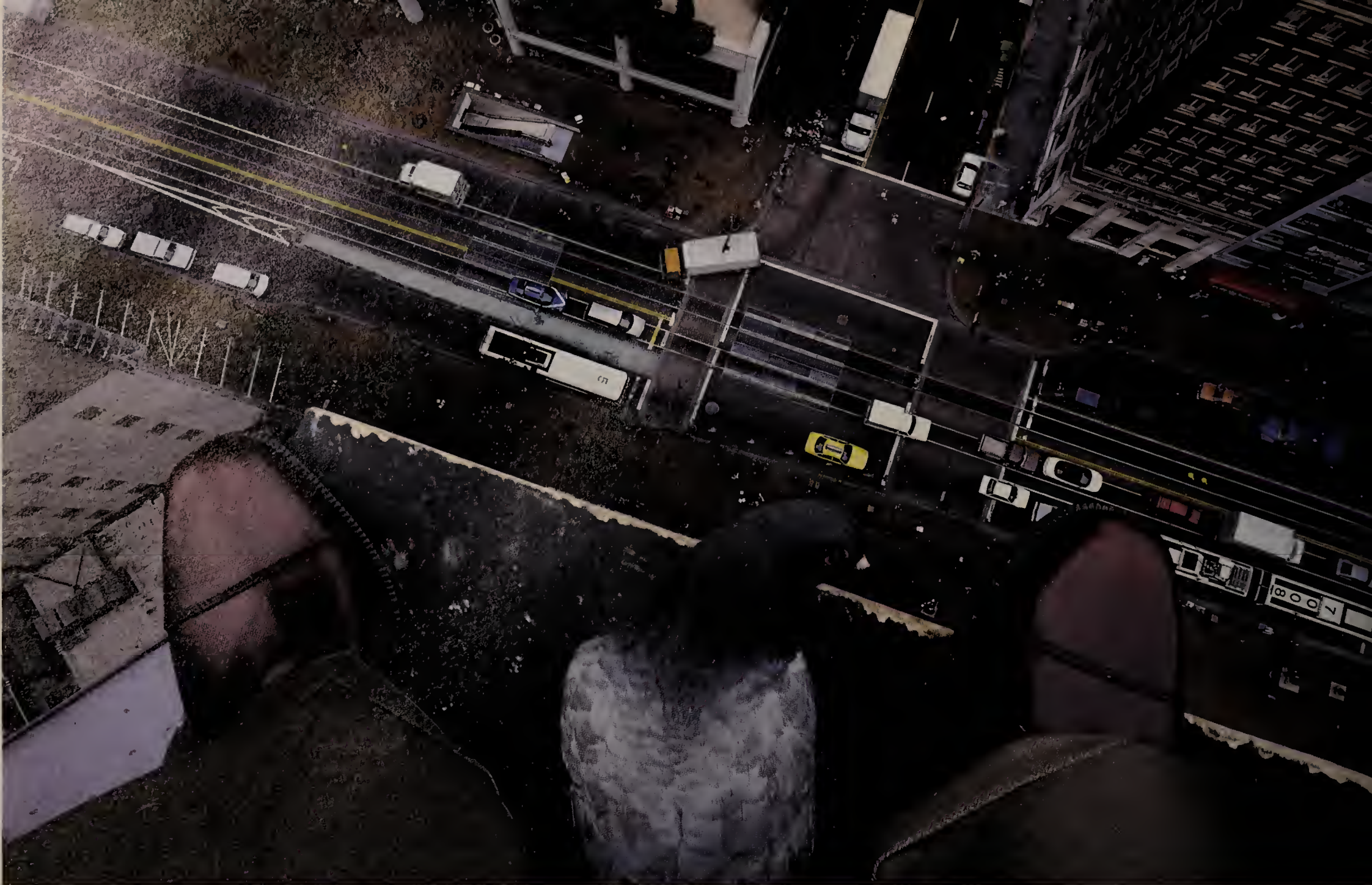
1 800 965-8548

[www.tivoli.com](http://www.tivoli.com)

**Tivoli**

Managing Network Computing. *The Smart Way.*





Choosing the wrong remote access products can be a fatal mistake. Only Ascend's leading remote access solution with inte-

grated Secure Access™ Firewall can protect your entire company. And only Ascend can do it right now. From the corporate level to the remote user to the telecommuter, advanced firewall security keeps every site

## If You Didn't Buy Ascend's Remote Access Products With Built-in Firewall Security, There Are Other Steps You Could Take.

safe. Security is transparent to users and unauthorized users are completely restricted. Plus, it's all managed and configured

from one central site, and compatible with most ISPs. Call now. The job you save may be your own. For your free

copy of "Access Denied: The Benefits of Integrated Security" Call 1-800-632-8347 ext. 407.



**Remote Networking Solutions That Work.™**

### MAX™ Family

Leading central site WAN access switch.\*  
Integrates Analog modems, ISDN BRI & PRI, SW56 and Frame Relay.  
Scalable from 8 to 672 ports.  
The only central site solution with integrated firewall.



[www.ascend.com](http://www.ascend.com)

### Pipeline™ Family

Award-winning remote access solution.  
Integrates Analog, ISDN BRI, SW56 and Frame Relay network services.  
Includes Ascend's Dynamic IP addressing for Internet Access.  
The only remote site solution with integrated firewall.



# Lucent PBX networking packs voice/data punch

*Company adds ATM dynamic bandwidth allocation to flagship Definity PBX, cranks out ATM concentrator.*

**By David Rohde**

*Basking Ridge, N.J.*

Lucent Technologies, Inc. last week enhanced its flagship PBX to make it easier for network managers to link together voice switches in widely dispersed locations.

The AT&T spin-off also introduced an ATM concentrator to take voice traffic off the PBX and feed it to ATM networks using dynamic bandwidth allocation.

The enhancements, including a new Windows-based PC management system, are included in Release 5.0 of the Definity Enterprise Communications Server (ECS). The Definity ECS name is Lucent's new tag for the widely installed Definity PBX to emphasize its integration into enterprise networking infrastructures.

## Lucent sweetens PBX pot

### Definity ECS Release 5.0 enhancements:

Enhanced signaling for dynamic bandwidth allocation

New ATM concentrator linked with Definity ECS

Extended mileage ranges for remote switching modules

Improved Q.932 support for linking different vendors' PBXs

New Windows-based management package

The goal of the enhancements is to allow Definity users to protect their investments while moving toward voice and data convergence, said Susan Barbier, strategic planning director for Lucent Business Communications Systems.

### Going over a MAN or WAN

Lucent's two PBX networking enhancements are designed to enable distributed workforces to employ Definity ECS features at remote locations without having to install an entire new high-end voice switch at the remote sites.

The first option is designed for users with access to private fiber in a metropolitan-area network (MAN). It allows users to extend a switch module up to 22 miles away from a Definity ECS located in a central site using single-mode fiber transceivers.

The second option requires users to lease private lines from carriers over a WAN. It enables the user to extend Definity ECS switching modules up to 3,500 miles from a central site using as many as four T-1 facilities.

For ATM users, Lucent is building support for dynamic bandwidth allocation with a new concentrator and wideband signaling upgrades in the switch itself. Such a scheme allows voice cells to be interleaved with data traffic instead of segregating voice traffic on its own constant bit rate permanent virtual circuit.

In such a fashion, according to analysts, users can realize the potential cost savings of ATM's ability to carry voice and data, instead of finding it a mere substi-

tute for traditional private-line networks.

The new ATM concentrator is called the Definity ECS NET90. The concentrator takes voice traffic off the PBX through its T-1/E-1 interface and feeds it to ATM switches. The concentrator, available at

the end of the year, costs \$5,500 to \$7,700, depending on configuration.

### Add, change, delete

Finally, Lucent introduced a new Windows-based software module called Terra-

nova ECS Station Administration. Among other features, the software allows network administrators to add, change or delete telephone stations.

Slated for general availability Sept. 30, Terranova ECS Station Administration is priced at \$2,900. Included in the price are two other modules, ECS Reports Generator and a remote LAN access package called ECS Communications.

©Lucent: (800) 325-7466.

# Ultimate Access.

ISDN, Frame Relay, SMDS, ATM



**ADC Kentrox®**

The Network Access Company™

[www.kentrox.com](http://www.kentrox.com)

(512) 434-1505



**N+I Booth 495**





Your Network

Multimedia Applications

You At The Office

# The object is to get through the hoop.

**With VIVID, it's nothin' but Net!** Corporate intranets. Multimedia applications. Network-wide video distribution. Is your network ready for these high-bandwidth, delay-sensitive applications? It is when you go with VIVID's switched routing. And you can do it today because VIVID's standard interfaces and protocols interoperate with your existing networking gear. It's that simple. Can your router do this? VIVID can. To find out how, call us at **1-800-DO-VIVID**. Or, check us out at **[www.vivid.newbridge.com](http://www.vivid.newbridge.com)**.



NEWBRIDGE

North and South America, 1 800 368-4843 or 1 703 834-3600 | Europe, Middle East and Africa, +44 (0) 1633 413600 | Asia Pacific, 1 613 591-3600

Newbridge and logo are registered trademarks, and VIVID and logo are trademarks of Newbridge Networks Corporation. © Copyright 1996 Newbridge Networks Corporation. All rights reserved.

**Coming to NetWorld + Interop? Win a free gift. Stop by our web site for details.**



# Visual pumps up UpTime, supports more services

*Company unveils managed DSU/CSU for more than frame relay.*

By Jim Duffy

Gaithersburg, Md.

Visual Networks, Inc. has enhanced its Visual UpTime product so it can now access and monitor a wider range of WAN services.

Initially a managed access device for frame relay services only, the Visual UpTime DSU/CSU can now monitor

The improvements are designed to allow companies to integrate the management of the various services that make up a hybrid WAN environment.

The Visual UpTime DSU/CSU supports line rates from 56K/64K bit/sec to T-1/E-1, and features Ethernet and token-ring interfaces. The device has an optional second port that allows users to send voice and data traffic over the same access line.

The CSU/DSU now supports more intelligent management agents that identify network performance.

Included in these agents is a Burst Advisor that recommends committed information rates and port rates based on 1-second usage measurements and historical data.

Typically, usage is measured in 15-minute summaries that provide an average of traffic burst rates and can create misleading usage information, according to the company.

Other new Visual UpTime capabilities are designed to enhance protocol analysis so users can identify complex protocol-related problems across multiple WAN services. They include:

- Selective traffic capture filtering by upper layer protocol fields

- Upper layer protocol statistics that leverage the emerging RMON2 standard
- The ability to profile network applications, such as Web, file transfer, mail and news.

The Visual UpTime management application, which runs on a Unix or Windows workstation, can summarize and analyze any of this data. It can run in stand-alone mode, or it can be launched from either a Hewlett-Packard Co. Open-

View or IBM NetView for AIX management platform as part of an overall enterprise management suite.

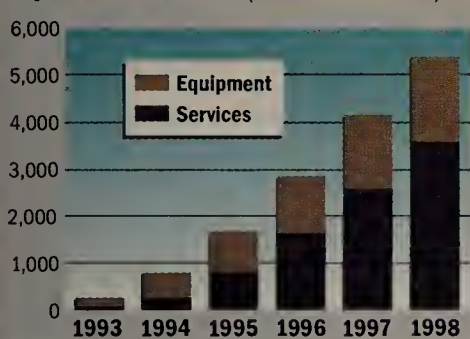
The data collection agents are priced from \$1,195 to \$3,595 with or without the CSU/DSU capabilities.

The management application costs \$11,995 for Windows and \$17,995 for Unix.

All products are available now.

©Visual: (301) 208-6784.

## FRAME RELAY SERVICES AND EQUIPMENT MARKET (in millions of dollars)



SOURCE: VERTICAL SYSTEMS GROUP, DEOHAM, MASS

multiple data services, including leased lines, Internet and X.25. The company has also upgraded Visual UpTime's data collection agents to provide, among other things, more detailed data on frame relay performance.

## BusinessBriefs

**Cabletron Systems, Inc.** has agreed to resell and support **Seagate Enterprise Management Software, Inc.**'s AppControl application and systems management software. Seagate obtained AppControl from Calypso Software Systems, Inc., a company Seagate acquired earlier this year. Calypso had been a Cabletron business partner. AppControl provides policy-based CPU, file system, memory, Web server and system process monitoring and logging, and software distribution. It will be available from Cabletron in the fourth quarter.

**Bay Networks** and **Phillips Business Electronics** announced last week both marketing and development agreements to integrate their product lines. The marketing agreement combines Bay's ATM, workgroup and campus switch line with Phillips' multimedia access equipment. The development agreement calls for cooperation on value-added multimedia applications incorporating both product lines and ensuring interoperability.

**Lucent Technologies, Inc.** and **ICG Communications, Inc.** last week announced a seven-year, \$1 billion deal for ICG to buy Lucent telecommunications equipment to expand ICG's local telecom networks nationwide. Equipment includes switches, SONET transport equipment, power plants and software.

**Newbridge Networks Corp.** announced creation of a new executive post, vice president of broadband alliances, and named Claude Haw to the post. Formerly, Haw was vice president of fast packet networks. In his new role, he will coordinate the ongoing relationship with Siemens to ensure that research and development efforts to create joint products meet user needs and to develop joint marketing and support. The alliance is designed to offer ATM gear from LANs to the core of carrier networks that can be administered under one management system.

**Shiva Corp.** and **Netcom On-line Communication Services** have teamed to offer Internet access plus Shiva's Internet access products WebRover stack, ShivaIntegrator 200 router and AccessPort ISDN client router. Netcom will provide dedicated, frame relay or ISDN connections to its network. The package will be available through value-added resellers that market Shiva products. Shiva can be reached at (617) 270-8300.

Under an agreement announced last week, **Hamilton Hallmark** will sell electronic components to **Telco Systems, Inc.** The agreement is designed to give Telco Systems a steady flow of parts it needs to deliver products faster.

Eye our manuals.

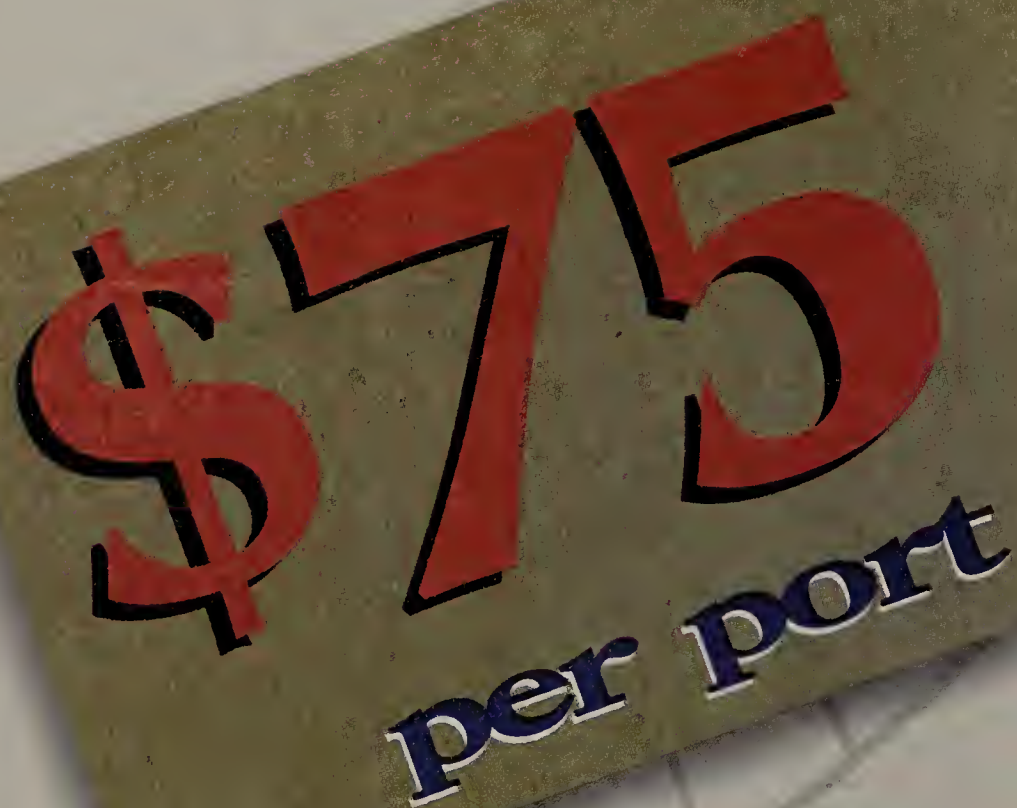
[www.kentrox.com](http://www.kentrox.com)

**ADC Kentrox**

The Network Access Company™



# SWITCHED ETHERNET



**\$75**  
per port

## NOW!

*from Matrox*



COME SEE US AT :

**NETWORLD+INTEROP 96**

Atlanta, GA, Sept. 18-20, Booth # 463

Paris, France, Oct. 9-11, Booth # H46



1-800-837-3611  
<http://www.matrox.com>  
E-Mail: [networks.info@matrox.com](mailto:networks.info@matrox.com)  
(514) 969-6080 Fax: (514) 969-6272

**INGRAM  
MICRO**

1-800-668-3450

**matrox**  
20 YEARS OF EXCELLENCE

Matrox is a registered trademark. Matrox Piranha, Matrox Networks and Matrox Shark are trademarks of Matrox Electronic Systems Ltd. All other trademarks are the property of their respective owners. Matrox reserves the right to change specifications without notice.



# HP links LAN with OpenView

*Professional application suite takes integration onus off the customer.*

**By Jim Duffy**

*Palo Alto, Calif.*

Hewlett-Packard Co. has unveiled an application suite for its OpenView for Windows platform that allows users to manage various LAN operations.

The Windows 95- and Windows NT-based offering, which had been anticipated, is called OpenView Professional Suite (NW, March 4, page 8). It melds the OpenView for Windows Workgroup Node Manager platform services with PC, server, printer and network device management software, as well as software distribution and metering tools.

The suite is targeted at companies with small to midsize networks that do little, if any, custom integration of third-party applications with OpenView for Windows.

"Before [integration] was a real hassle because if you wanted to upgrade your software, something would pretty much be guaranteed not to work with something else," said Garry Winer, network administrator at DonTech in Chicago. "Those issues are all resolved."

Still, Winer said he would like to see more functionality in Professional Suite, such as help desk and trouble-ticketing capabilities.

Analysts said the applications in the suite could stand to work better together.

"They have some common look and feel between the point products within the suite, but they are not fully integrated," said Bob Sakakeeny, an analyst at Aberdeen Group, Inc. in Boston. "It's not a smooth transition from one [application] to the other. They also need a little more work on getting the alerts up to the [Unix-based] Big Daddy OpenView."

In all, the Professional Suite has 12 LAN management elements, including

HP's own OpenView Workgroup Node Manager, HP AdvanceStack Assistant, HP Expose, JetAdmin, NetServer Assistant, NetMetrix/Win, PowerWise and TopTools applications. Components contributed from other vendors include Symantec Corp.'s Norton Administrator for Networks and Norton pcAnywhere, ExMachina's Notify Connect and McAfee's Saber LAN Workstation.

Workgroup Node Manager provides IP and IPX device discovery, mapping, polling and alarm/trap status notification. AdvanceStack Assistant is an SNMP-based application for monitoring traffic and managing devices for HP's hubs, switches and bridges.

HP Expose monitors Windows NT, NetWare and VINES network operating systems, while JetAdmin provides remote installation, configuration and management of HP printers. NetServer Assistant monitors SCSI controllers, hard drives, memory and power supplies. NetMetrix/Win provides information on network health through access to Remote Monitoring agents.

PowerWise manages power supplies, and TopTools manages PC hardware inventory, firmware, configuration settings and security features via access to the Desktop Management Task Force's Desktop Management Interface agents.

Norton Administrator for Networks provides central administration of heterogeneous desktop computers. Norton pcAnywhere provides remote access to Windows 95 and NT applications and data.

Professional Suite will be available in October for \$1,495. That price includes a one-server, 10-node license for the Symantec and McAfee products.

©HP: (800) 752-0900.

tems, Inc. and Madge Networks, Inc.

RAServer 2000 supports two Primary Rate Interface ISDN lines or eight Basic Rate Interface lines, allowing it to handle as many as 60 remote users at once.

The ruggedized RAServer 2500 supports up to four PRIs or 32 BRIs, for a total of 120 concurrent dial-in connections. Five of the servers can be interconnected in the same rack to offer 600 ports.

Later RAServer releases will include firewalls and other security beyond that already provided by NT Server, RAScom said.

The company can deal with the local phone company to establish ISDN lines and offers a free help desk from 8 a.m. to 8 p.m., with a 24-hour hotline for an extra charge. As a standard service, if one of the servers should fail and cannot be brought up, the company offers an identically configured replacement of the downed unit within 24 hours.

RAServer 2000 costs between \$8,500 and \$24,500, and RAServer 2500 is priced at \$16,500 to \$50,500. They will ship next month.

©RAScom: (603) 898-5200.

## Racal

*Continued from page 21*

switch is out, the device will automatically dial in to the next closest switch.

As for network management features, the FastFrames will get two new applications — one to control FRAD configurations called the Wizard and a network statistics package that lets users monitor congestion, error rates and other traffic

data. The applications will first run on Racal's own package, Communications Management Services, and will be available for other management platforms such as Hewlett-Packard Co.'s OpenView.

The FastFrame Models 200, 300 and 500 are priced at \$995, \$1,795 and \$3,395, respectively. The Model 200 is available now and the 300 and 600 will be available in the first quarter of 1997.

©Racal: (954) 846-5609.

Check our specs.

[www.kentrox.com](http://www.kentrox.com)

**ADC Kentrox**

The Network Access Company™

## RAScom

*Continued from page 29*

customize each server by supporting a broad array of plug-in devices. RAScom will expand that practice later this year by teaming up with another unnamed vendor to offer analog dial-up in addition to ISDN.

The company hopes to use its open approach to take on remote access veterans Ascend Communications Corp., Cisco Systems, Inc. and Shiva Corp., which rely on their own operating systems, buses and interfaces.

Wes Kussmaul of The Village Group, located here, said his company was attracted by a number of factors: the openness, the Windows NT Server operating system and the ability to configure the server on-the-fly for local network interfaces. The company plans to incorporate RAServers in an Internet hosting system it is developing.

The RAServer Series 2000 products can be configured with Ethernet, token-ring, FDDI and ATM interface cards that RAScom gets from 3Com Corp., Fore Sys-



# IP address managers bolstered

By Jim Duffy

Two IP address management vendors have upgraded their wares to ease network administration and provide more options for enterprisewide deployment.

Quadritek Systems, Inc. last week rolled out Windows NT and database

extensions to its Quadritek IP Management System (QIP). And ISOTRO Network Management, Inc. moved to ease network administration by automating Domain Name Service (DNS) and Dynamic Host Configuration Protocol (DHCP) management and configura-

tion. Users can now deploy a mix of Unix and Windows NT systems for managing their IP name and address structures, Quadritek said. And they can catalog all network resources in Oracle Corp. and Microsoft Corp. SQL Server databases, in addition to the Sybase, Inc. databases QIP already supports.

QIP for NT enterprise server software is available now. QIP for NT remote server software will ship in mid-October.

QIP's Microsoft SQL Server module for Windows NT ships Sept. 26. QIP's Oracle module is available now.

## Management battle

Not to be outmaneuvered, ISOTRO has enhanced the DNS and DHCP servers of its NetID management system so they can be managed remotely through NetID's Admin Tool.

When a DHCP client joins the network, it requests an address and suggests a name. The NetID DHCP Server verifies that the name and address are unique and enters them in the NetID database.

The DHCP Server then responds to the DHCP client with the IP address and other DHCP options, such as network domain name, address of network servers and gateways, and the subnet mask. Once the DHCP Server has registered the changes in the database, the DNS Server detects the changes, retrieves the data and automatically updates the DNS, the company said.

The NetID DNS and DHCP Servers are currently available. The NetID DNS server costs \$2,495, while pricing for the NetID DHCP server is based on the number of addresses.

©Quadritek: (800) 408-2747; ISOTRO: (613) 722-1921.



Verilink's WAN access cards offer you easy, money-saving access to the winning suit of broadband services. We play it straight—so you can bank your savings.

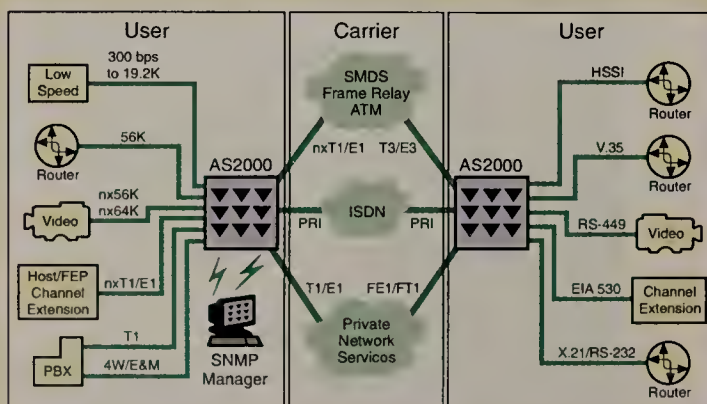
## Verilink's AS2000 Integrated Access Cards stack the deck in your favor

Even when your network costs change, you'll still be holding the winning access cards.

No matter which service provides the bandwidth you need, tariff changes can quickly—and dramatically—affect your bottom line.

For Dave, reductions in leased-line costs, changes in calling rates, discount offers, and the availability of new services aren't wild cards—they're opportunities. Because AS2000's flexibility lets him squeeze the most out of his network. In spades.

The DS0/E0 micro-DCS capability lets Dave build circuits between any two data ports. Channel grooming guarantees that not one bit of bandwidth is wasted. Automatic band-



width allocation gives him the edge in resource management.

So, do like Dave. Deal yourself a winning hand every time with AS2000's universal platform. The most flexible way to build your network, keep your investments risk-free, and beat tomorrow's challenges hands down. All backed by a 5-year warranty.

For openers, call 1.800.VERILINK. Or look for us on the World Wide Web: <http://www.verilink.com>.



## Kaspia easily spots problems, causes

By Jim Duffy

Beaverton, Ore.

Kaspia Systems, Inc. has unveiled a network monitoring system it says will automatically identify problems and likely causes.

The Kaspia Monitoring System runs on Windows NT workstations and is accessible through a Web browser. It provides automated discovery and collection of information across the enterprise, and Web-based reports that serve as road maps to problem areas of the network, according to the company.

The Kaspia Monitoring System polls as many as 5,000 network hosts and internetwork objects containing Management Information Base (MIB) data. From this information, the system creates a network topology database and periodically polls the MIBs for net performance metrics.

The Kaspia console processes statistical information for report generation, data collection configuration and management, data browsing and graphing, inventory browsing and trap-level integration with enterprise management systems.

The system's Report Center identifies network segments that need attention and an explanation of how each conclusion is reached. It also includes information on how to begin the diagnostic process, thereby eliminating the need for network managers to manually locate a network problem.

The Kaspia Monitoring System is priced from \$5,000 to \$36,000 and is available now.

©Kaspia: (503) 644-1800.



# THE ULTIMATE EXPERIENCE IN BRANCH OFFICE ACCESS COLORADO

communications costs, decrease network complexity, and improve the manageability of their network.



The landscape of remote access is changing and Colorado is equipped to handle the most demanding twists and turns. It is available with an Ethernet or Token Ring LAN interface and supports three WAN connections and an optional ISDN Basic Rate Interface. Another model, Colorado Plus, supports all the features of the Colorado but includes two Ethernets or an Ethernet and a Token Ring interface.

With Colorado you'll be prepared for the unexpected as you embark on an internetworking journey. It addresses all your networking concerns in a compact integrated solution designed to save you money. Call **1-800-444-7854** today and receive a FREE Travel Guide to the Rivers of ACC.

**For consolidation of LAN and legacy traffic over Frame Relay, X.25, and ISDN lines.**

ACC tames the demanding rapids of internetworking with Colorado, the breathtaking solution for almost any remote access application. Colorado can route LAN traffic and consolidate legacy network equipment such as SNA, X.25, etc., over the same wide area connection. And through the availability of Frame Relay, X.25, or ISDN, network managers can reduce their ongoing

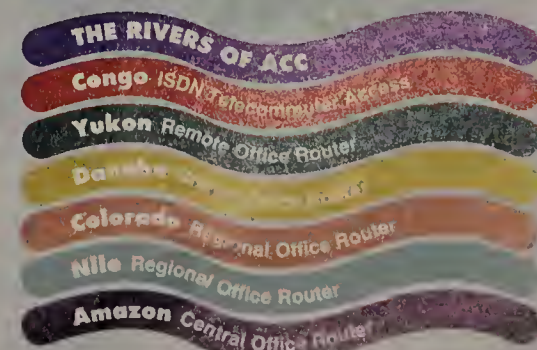


Access begins with ACC.

805 961 0294 • London 44 1 372 470606  
33 1 3012 9630 • Stockholm 46 8 590 727 50  
els 32 2 633 6382 • Hong Kong 852 2 668 6824

© 1996 ACC, Inc. Colorado and ACC are registered trademarks.  
Newbridge Affiliate

Learn more about Colorado at: <http://www.acc.com:80/Products/colorado.html>





INTERNETWORKING  
MONITOR

Scott Bradner



## Installing complacency

**I**t seems that everyone has to have a firewall these days.

Corporate managers want to protect their assets from the evil doers out there on the Internet. Countries and corporate moralists want to protect their employees from the evil things out there on the 'Net. China, for instance, seems to

be looking to its past for inspiration and thinking about building The Great Firewall to protect its billions of potential Internet users. And auditors now seem to have a little checkbox for firewalls: You have one? Good, you pass. Now on to the next checkbox.

Don't get me wrong, I think firewalls

can be good things. Of course, you have to take care to match your requirement set to the function set of the device you select. If all you want to do is block TFTP (Trivial File Transfer Protocol) and NFS (Network File System) traffic then you can program filters in to your border router and call it a firewall. If you want to get fancier — controlling who on the inside can do what looking out, and who on the outside can do what looking in — then you will most likely need to get one of the devices specifically built as firewalls.

You can get quite fancy with these devices, including blocking or permitting employee access to specific Web sites, allowing customer access only to specific internal Web servers or even blocking E-mail from Bill to Fred.

What big difference does it make to the security of your network to put a firewall between it and the rest of the Internet? If you assume all the bad people are "out there," a firewall can significantly decrease the vulnerability to successful attacks on your resources or information. But is the assumption of the compartmentalization of bad guys valid? Not if you look at history. The vast majority of known cases of network or computer security violations have been perpetrated by insiders. This makes a great deal of sense. Unless you are rather dumb and name the computer that has your corporate secrets in it "good stuff here," it can be quite hard for some outsider to know where to look.

There are the mixed cases of an insider being out there and still knowing the lay of the network, or an outsider with inside help. Putting in a firewall between you and the 'Net can help solve part of your network security problem, but you must keep in mind that your biggest threat continues to be people with legitimate access to the local network. In other words, your own users.

I think there is a real threat introduced by the installation of a firewall. That is the threat of complacency. Since you have a firewall, you might think you no longer need to be worried about the heretofore normal security procedures — good passwords, installing security bug fixes promptly, verifying host configurations with programs such as COPS (on [cert.sei.cmu.edu](http://cert.sei.cmu.edu) in the directory pub/cops for anonymous FTP), not sharing accounts, keeping good logs and having a specific security incident phone hot line.

Firewalls can be very helpful, and you do not need to limit the use of firewalls to the one external Internet link. Firewalls can also be used internally, to protect sensitive subnets from internal prying eyes. But be sure to remember that the major threat is still within the wall and an external firewall just more clearly delineates what internal means. Good internal security procedures must be followed and, where it is needed, strengthened.

Disclaimer: Harvard's experiences with firewalls goes back to the Revolutionary War days when Harvard Hall caught fire, but the above are my cautions.

*Bradner is a consultant with Harvard University's Office of Information Technology. He can be reached via [sob@harvard.edu](mailto:sob@harvard.edu).*

# The only network storage systems that won't box you in.

The last thing a data network storage system should make you feel is trapped. So to keep you ahead of the game, AT&T CommVault developed a fully integrated line of network storage management solutions that offers optimum flexibility. Backed by the incomparable AT&T reputation, our data network storage systems can accommodate more server platforms than any other storage systems—including GIS, Sun, Tandem, HP, IBM, SGI, DEC, Aupex and many more. From automated backup and retrieval, to large database storage management, to hierarchical storage management and on-line/near-line archiving, we provide an extensive selection of unique products and services to meet any network storage need. And, your

system will be continually supported by the most extensive range of options, offering you the greatest flexibility and growth. Accepting full-system responsibility, our service/support program is unique within the industry. By being the single-point-of-contact, our highly-trained technicians are able to provide the most responsive service and support. By offering a complete solution, our systems help manage all your network storage devices more efficiently and with greater data integrity—reducing new system costs, increasing user productivity and eliminating the risk of unauthorized file access. So choose the data network storage systems that offer you the most freedom—AT&T CommVault.



**AT&T**  
CommVault Systems

For more information: call us at 1 (800) 331-6207, fax (908) 935-8040, or visit our web site at <http://www.att.com>

UNIX • Novell • Banyan • Windows NT • VMS • OS/2 • Lotus Notes



# Yes! I want my FREE subscription to *NetworkWorld*.

☐ No, Thank You.

Do you wish to receive Intranet Magazine? (It will be a monthly publication with content similar to Intranet supplement within Network World.) ☐ Yes ☐ No

Sign Here \_\_\_\_\_  
Signature \_\_\_\_\_ Date \_\_\_\_\_

To qualify: You must supply your company name and address. *Please Print Clearly.*

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Business phone (\_\_\_\_\_) \_\_\_\_\_

Business FAX (\_\_\_\_\_) \_\_\_\_\_

Internet e-mail address \_\_\_\_\_

If there is a parent company, please provide name: \_\_\_\_\_

## 1 Industry: (check one only)

- |   |  |
|---|--|
| 01. <input type="checkbox"/> Manufacturers (other)  | 12. <input type="checkbox"/> Government (Federal/State/Local)                    |
| 02. <input type="checkbox"/> Finance/Banking  | 13. <input type="checkbox"/> Military  |
| 03. <input type="checkbox"/> Insurance/Real Estate/Legal  | 14. <input type="checkbox"/> Aerospace   |
| 04. <input type="checkbox"/> Health Care Services   | 15. <input type="checkbox"/> Consultants (Independent)                           |
| 05. <input type="checkbox"/> Hospitality/Entertainment/Recreation   | 16. <input type="checkbox"/> Carriers/Interconnects                              |
| 06. <input type="checkbox"/> Media/TV/Cable/Radio/Print   | 17. <input type="checkbox"/> Manufacturers (Computer/Communications)             |
| 07. <input type="checkbox"/> Retail/Wholesale Trade/Business Services   | 18. <input type="checkbox"/> Resellers of Computer/Network Products (VARs, VADs) |
| 08. <input type="checkbox"/> Transportation   | 19. <input type="checkbox"/> Systems/Network Integrators                         |
| 09. <input type="checkbox"/> Utilities  | 20. <input type="checkbox"/> Distributors (Computer/Communications)              |
| 10. <input type="checkbox"/> Education  | 21. <input type="checkbox"/> Other (please specify) _____                        |
| 11. <input type="checkbox"/> Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry) |  |

## 2 What is your job function? (check one only)

### NETWORK IS MANAGEMENT:

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Networking Management           | 5. <input type="checkbox"/> Engineering Management   |
| 2. <input type="checkbox"/> LAN Management                  | 6. <input type="checkbox"/> Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management) |
| 3. <input type="checkbox"/> Datacom/Telecom Management      | 7. <input type="checkbox"/> Consultant (Independent)   |
| 4. <input type="checkbox"/> IS, IT, MIS, Systems Management | 8. <input type="checkbox"/> Other (please specify) _____   |

## 3 What is the estimated value of networking equipment and services that you help specify, recommend or approve? (check one only)

- |  |  |  |
|--|--|--|
| 01. <input type="checkbox"/> \$100 million or more   | 05. <input type="checkbox"/> \$10 mil. - \$19.9 mil. | 09. <input type="checkbox"/> \$250,000 - \$499,999 |
| 02. <input type="checkbox"/> \$50 mil. - \$99.9 mil. | 06. <input type="checkbox"/> \$5 mil. - \$9.9 mil.   | 10. <input type="checkbox"/> \$100,000 - \$249,999 |
| 03. <input type="checkbox"/> \$25 mil. - \$49.9 mil. | 07. <input type="checkbox"/> \$1 mil. - \$4.9 mil.   | 11. <input type="checkbox"/> None of the above     |
| 04. <input type="checkbox"/> \$20 mil. - \$24.9 mil. | 08. <input type="checkbox"/> \$500,000 - \$999,999   |  |

## 4 What is the total number of sites for which you have purchase influence? (check one only)

- |                                     |                                     |                                  |
|-------------------------------------|-------------------------------------|----------------------------------|
| 1. <input type="checkbox"/> 100+    | 4. <input type="checkbox"/> 10 - 19 | 7. <input type="checkbox"/> None |
| 2. <input type="checkbox"/> 50 - 99 | 5. <input type="checkbox"/> 2 - 9   |                                  |
| 3. <input type="checkbox"/> 20 - 49 | 6. <input type="checkbox"/> 1       |                                  |

## 5 Are you involved in the purchase of and/or plan to purchase network products and services?

☐ Yes ☐ No

## 6 Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:

B. I plan to purchase the following products/services:

### LOCAL-AREA NETWORKS

- |   |  |
|---|--|
| A   | B  |
| <input type="checkbox"/> 01. Local-Area Networks                      | <input type="checkbox"/> 48. Web Browsers                            |
| <input type="checkbox"/> 02. Network Op. Sys. Software                | <input type="checkbox"/> 49. Intranet Applications/Groupware         |
| <input type="checkbox"/> 03. LAN Storage/Backup                       | <input type="checkbox"/> 50. Search Retrieval Products (web crawler) |
| <input type="checkbox"/> 04. Optical LAN Storage/Backup               | <input type="checkbox"/> 51. Internet Development Tools              |
| <input type="checkbox"/> 05. Disk LAN Storage/Backup                  | <input type="checkbox"/> 52. Internet Commerce Tools                 |
| <input type="checkbox"/> 06. Tape LAN Storage/Backup                  |  |
| <input type="checkbox"/> 07. RAID LAN Storage/Backup                  |  |
| <input type="checkbox"/> 08. Network Test/Diagnostic Tools            |  |
| <input type="checkbox"/> 09. Cables, Connectors, Baluns               |  |
| <input type="checkbox"/> 10. UPS                                      |  |
| <input type="checkbox"/> 11. Network Interface Cards                  |  |
| <input type="checkbox"/> 12. Peer-to-Peer LANs                        |  |
| <input type="checkbox"/> 13. SNMP Network Management                  |  |
| <input type="checkbox"/> 14. ATM Switches                             |  |
| <input type="checkbox"/> 15. Token-Ring Switches                      |  |
| <input type="checkbox"/> 16. Ethernet Switches                        |  |
| <input type="checkbox"/> 17. Remote LAN Access/Communications Servers |  |
| <input type="checkbox"/> 18. Superservers                             |  |
| <input type="checkbox"/> 19. File/Application Servers                 |  |
| <input type="checkbox"/> 20. Print Servers/Fax Servers                |  |
| <input type="checkbox"/> 21. CD-ROM Servers                           |  |
| <input type="checkbox"/> 22. LAN Servers                              |  |

### INTERNETWORKING

- |   |   |
|---|---|
| A   | B |
| <input type="checkbox"/> 23. Bridges          |   |
| <input type="checkbox"/> 24. Routers          |   |
| <input type="checkbox"/> 25. Bridge/Router    |   |
| <input type="checkbox"/> 26. Gateways         |   |
| <input type="checkbox"/> 27. Intelligent Hubs |   |
| <input type="checkbox"/> 28. Stackable Hubs   |   |

### COMPUTERS/PERIPHERALS

- |  |   |
|--|---|
| A  | B |
| <input type="checkbox"/> 29. Laptops/Notebooks/Sub-Notebooks |   |
| <input type="checkbox"/> 30. Micros/PCs                      |   |
| <input type="checkbox"/> 31. Minis                           |   |
| <input type="checkbox"/> 32. Mainframes                      |   |
| <input type="checkbox"/> 33. Workstations                    |   |
| <input type="checkbox"/> 34. Terminals                       |   |
| <input type="checkbox"/> 35. Printers/Network Printers       |   |
| <input type="checkbox"/> 36. Cluster Controllers             |   |
| <input type="checkbox"/> 37. CD-ROM                          |   |
| <input type="checkbox"/> 38. Fax/Modem Boards                |   |

### REMOTE/WIRELESS COMPUTING

- |  |   |
|--|---|
| A  | B |
| <input type="checkbox"/> 39. PDAs                          |   |
| <input type="checkbox"/> 40. PCMCIA Devices                |   |
| <input type="checkbox"/> 41. Wireless Data Services        |   |
| <input type="checkbox"/> 42. Wireless Data Equipment       |   |
| <input type="checkbox"/> 43. Wireless LANs                 |   |
| <input type="checkbox"/> 44. Cellular Equipment & Services |   |

### INTERNET/INTRANET

- |  |   |
|--|---|
| A  | B |
| <input type="checkbox"/> 45. Internet Access Service |   |
| <input type="checkbox"/> 46. Firewalls/Security      |   |
| <input type="checkbox"/> 47. Web Servers             |   |

### INTERNET/INTRANET (cont'd)

- |  |   |
|--|---|
| A  | B |
| <input type="checkbox"/> 48. Web Browsers                            |   |
| <input type="checkbox"/> 49. Intranet Applications/Groupware         |   |
| <input type="checkbox"/> 50. Search Retrieval Products (web crawler) |   |
| <input type="checkbox"/> 51. Internet Development Tools              |   |
| <input type="checkbox"/> 52. Internet Commerce Tools                 |   |

### SOFTWARE/APPLICATIONS

- |   |   |
|---|---|
| A   | B |
| <input type="checkbox"/> 53. Network Management                     |   |
| <input type="checkbox"/> 54. Systems Management                     |   |
| <input type="checkbox"/> 55. Security                               |   |
| <input type="checkbox"/> 56. Communications Software                |   |
| <input type="checkbox"/> 57. Terminal Emulation                     |   |
| <input type="checkbox"/> 58. Word Processing                        |   |
| <input type="checkbox"/> 59. Operating Systems                      |   |
| <input type="checkbox"/> 60. Client/Server Applications Development |   |
| <input type="checkbox"/> 61. Database Management/RDBMS              |   |
| <input type="checkbox"/> 62. Spreadsheet                            |   |
| <input type="checkbox"/> 63. Groupware                              |   |
| <input type="checkbox"/> 64. EDI                                    |   |
| <input type="checkbox"/> 65. E-mail                                 |   |
| <input type="checkbox"/> 66. Windows/Graphical User Interface       |   |
| <input type="checkbox"/> 67. Multimedia                             |   |
| <input type="checkbox"/> 68. Graphics/DTP                           |   |
| <input type="checkbox"/> 69. Remote Access                          |   |
| <input type="checkbox"/> 70. Imaging                                |   |
| <input type="checkbox"/> 71. Server Suites (Back office, etc.)      |   |
| <input type="checkbox"/> 72. Suites                                 |   |
| <input type="checkbox"/> 73. Middleware                             |   |
| <input type="checkbox"/> 74. Document Management                    |   |
| <input type="checkbox"/> 75. Database Server                        |   |
| <input type="checkbox"/> 76. Site Metering Tools                    |   |
| <input type="checkbox"/> 77. Computer-Integrated Telephony (CIT)    |   |

### WIDE-AREA NETWORK EQUIPMENT & SERVICES

- |   |   |
|---|---|
| A   | B |
| <input type="checkbox"/> 78. Frame Relay Equip./Services              |   |
| <input type="checkbox"/> 79. Modems                                   |   |
| <input type="checkbox"/> 80. FT-1/T-1/T-3 Multiplexers                |   |
| <input type="checkbox"/> 81. FT-1/T-1/T-3 Services                    |   |
| <input type="checkbox"/> 82. SONET                                    |   |
| <input type="checkbox"/> 83. Inverse Multiplexers                     |   |
| <input type="checkbox"/> 84. SMDS                                     |   |
| <input type="checkbox"/> 85. Asynchronous Transfer Mode               |   |
| <input type="checkbox"/> 86. Diagnostic/Test Equipment                |   |
| <input type="checkbox"/> 87. DSU/CSU                                  |   |
| <input type="checkbox"/> 88. VSAT/Satellite                           |   |
| <input type="checkbox"/> 89. ISDN Equipment & Services                |   |
| <input type="checkbox"/> 90. PBXs                                     |   |
| <input type="checkbox"/> 91. Voice Mail/Response                      |   |
| <input type="checkbox"/> 92. Videoconferencing                        |   |
| <input type="checkbox"/> 93. Leased Lines                             |   |
| <input type="checkbox"/> 94. Switched Data                            |   |
| <input type="checkbox"/> 95. E-mail                                   |   |
| <input type="checkbox"/> 96. 800/900/MTS Services                     |   |
| <input type="checkbox"/> 97. Virtual Networks                         |   |
| <input type="checkbox"/> 98. Outsourcing/Systems Integration Services |   |
| <input type="checkbox"/> 99. Education/Training Services              |   |

☐ 107 ☐ None of the above (1-99)

# NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

☐ My home address is also my business address.

### Optional delivery address:

Enter your home address below if your company will not accept delivery at your business address:

Street address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

If military, please specify branch and base: \_\_\_\_\_

If government, please specify division: \_\_\_\_\_

Visit our Web Information Service, *NetworkWorld Fusion*™, and apply on-line at <http://www.nwfusion.com>

Publisher reserves the right to serve only those individuals who meet publication qualifications. Incomplete forms will not be processed.

9602

## 7 Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:

B. The following network platforms are planned for purchase:

### NETWORK PROTOCOLS

- |   |   |
|---|---|
| A   | B |
| <input type="checkbox"/> 01. SNA                          |   |
| <input type="checkbox"/> 02. DECnet                       |   |
| <input type="checkbox"/> 03. TCP/IP                       |   |
| <input type="checkbox"/> 04. Novell IPX/SPX               |   |
| <input type="checkbox"/> 05. APPC/APPN/LU 6.2             |   |
| <input type="checkbox"/> 06. NETBIOS                      |   |
| <input type="checkbox"/> 07. AppleTalk                    |   |
| <input type="checkbox"/> 08. NFS                          |   |
| <input type="checkbox"/> 09. IPv6                         |   |
| <input type="checkbox"/> 10. SNMP/SNMPv2                  |   |
| <input type="checkbox"/> 11. Other (please specify) _____ |   |

### NETWORK OPERATING SYSTEM

- |   |   |
|---|---|
| A   | B |
| <input type="checkbox"/> 12. Microsoft (LAN Manager)      |   |
| <input type="checkbox"/> 13. Novell (NetWare 2.X, 3.X)    |   |
| <input type="checkbox"/> 14. Novell (NetWare 4.X)         |   |
| <input type="checkbox"/> 15. Windows NT                   |   |
| <input type="checkbox"/> 16. Windows NT/Advanced Server   |   |
| <input type="checkbox"/> 17. LocalTalk (AppleTalk)        |   |
| <input type="checkbox"/> 18. Banyan (VINES)               |   |
| <input type="checkbox"/> 19. IBM (LAN Server)             |   |
| <input type="checkbox"/> 20. IBM (PC LAN Program)         |   |
| <input type="checkbox"/> 21. Artisoft (LANtastic)         |   |
| <input type="checkbox"/> 22. Digital (Pathworks)          |   |
| <input type="checkbox"/> 23. Other (please specify) _____ |   |

### LAN ENVIRONMENT

- |   |   |
|---|---|
| A   | B |
| <input type="checkbox"/> 24. 4M Token Ring                |   |
| <input type="checkbox"/> 25. 16M Token Ring               |   |
| <input type="checkbox"/> 26. Ethernet                     |   |
| <input type="checkbox"/> 27. Fast Ethernet                |   |
| <input type="checkbox"/> 28. 100vg Any LAN                |   |
| <input type="checkbox"/> 29. FDDI                         |   |
| <input type="checkbox"/> 30. LocalTalk                    |   |
| <input type="checkbox"/> 31. iBase-T                      |   |
| <input type="checkbox"/> 32. ATM                          |   |
| <input type="checkbox"/> 33. Other (please specify) _____ |   |

### COMPUTER OPERATING SYSTEM

- |   |   |
|---|---|
| A   | B |
| <input type="checkbox"/> 34. DOS                          |   |
| <input type="checkbox"/> 35. Unix/Xenix/AIX               |   |
| <input type="checkbox"/> 36. OS/2                         |   |
| <input type="checkbox"/> 37. OS/2 Warp                    |   |
| <input type="checkbox"/> 38. IBM MVS                      |   |
| <input type="checkbox"/> 39. IBM VM                       |   |
| <input type="checkbox"/> 40. Digital VMS                  |   |
| <input type="checkbox"/> 41. Macintosh                    |   |
| <input type="checkbox"/> 42. Windows                      |   |
| <input type="checkbox"/> 43. Windows 95                   |   |
| <input type="checkbox"/> 44. NT                           |   |
| <input type="checkbox"/> 45. Solaris                      |   |
| <input type="checkbox"/> 46. Other (please specify) _____ |   |
| <input type="checkbox"/> 47. None of the above (1-46)     |   |

## 8 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

### A. SCOPE

(check one only)

1. ☐ Corporate/Enterprise  
2. ☐ Department  
3. ☐ None

### B. INVOLVEMENT (check all that apply)

1. ☐ Recommend/Specify  
2. ☐ Approve  
3. ☐ Evaluate  
4. ☐ Determine the need  
5. ☐ None

## 9 What is the total number of LANs, workstations/nodes at this location/in your organization?

### At this location:

- |   |                          |
|---|--------------------------|
| LANs                                      | Workstations/<br>Nodes   |
| 1. <input type="checkbox"/> 5,000+        | <input type="checkbox"/> |
| 2. <input type="checkbox"/> 1,000 - 4,999 | <input type="checkbox"/> |
| 3. <input type="checkbox"/> 100 - 999     | <input type="checkbox"/> |
| 4. <input type="checkbox"/> 50 - 99       | <input type="checkbox"/> |
| 5. <input type="checkbox"/> 10 - 49       | <input type="checkbox"/> |
| 6. <input type="checkbox"/> 1 - 9         | <input type="checkbox"/> |

### Entire organization:

- |   |                          |
|---|--------------------------|
| LANs                                      | Workstations/<br>Nodes   |
| 1. <input type="checkbox"/> 5,000+        | <input type="checkbox"/> |
| 2. <input type="checkbox"/> 1,000 - 4,999 | <input type="checkbox"/> |
| 3. <input type="checkbox"/> 100 - 999     | <input type="checkbox"/> |
| 4. <input type="checkbox"/> 50 - 99       | <input type="checkbox"/> |
| 5. <input type="checkbox"/> 10 - 49       | <input type="checkbox"/> |
| 6. <input type="checkbox"/> 1 - 9         | <input type="checkbox"/> |

## 10 Please indicate your involvement in developing/implementing Internet/Intranet Technologies: (check all that apply)

1. ☐ Recommend/Specify  
2. ☐ Approve  
3. ☐ Evaluate  
4. ☐ Determine the need  
5. ☐ Implement  
6. ☐ None

## 11 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

- | Mainframes                          |                          | Minis                                    |                          |
|-------------------------------------|--------------------------|--|--------------------------|
| A - Installed                       | B - Planned              | C - Installed                            | D - Planned              |
| 1. IBM <input type="checkbox"/>     | <input type="checkbox"/> | 1. IBM <input type="checkbox"/>          | <input type="checkbox"/> |
| 2. Amdahl <input type="checkbox"/>  | <input type="checkbox"/> | 2. Digital <input type="checkbox"/>      | <input type="checkbox"/> |
| 3. Cray <input type="checkbox"/>    | <input type="checkbox"/> | 3. Tandem <input type="checkbox"/>       | <input type="checkbox"/> |
| 4. Hitachi <input type="checkbox"/> | <input type="checkbox"/> | 4. Unisys <input type="checkbox"/>       | <input type="checkbox"/> |
| 5. Unisys <input type="checkbox"/>  | <input type="checkbox"/> | 5. AT&T GIS <input type="checkbox"/>     | <input type="checkbox"/> |
|                                     |                          | 6. HP <input type="checkbox"/>           | <input type="checkbox"/> |
|                                     |                          | 7. Data General <input type="checkbox"/> | <input type="checkbox"/> |

What is the total number of Servers/Clients installed/planned: (USE NUMBERS ONLY)

E-AT THIS LOCATION	#	F-% with Internet Access
1. Servers	<input type="text"/>	<input type="text"/> %
2. Clients	<input type="text"/>	<input type="text"/> %

G-ENTIRE ORGANIZATION	#	H-% with Internet Access
1. Servers	<input type="text"/>	<input type="text"/> %
2. Clients	<input type="text"/>	<input type="text"/> %

Which of the following Servers/Clients do you have installed/planned: (CHECK ALL THAT APPLY)

	At this location: I-Servers	J-Clients	Entire organization: K-Servers	L-Clients
01. Power PC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
02. Power Mac	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
03. Mac Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
04. Multi Processor Servers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
05. P6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
06. Pentium Pro	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
07. Pentium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
08. 486	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
09. 386	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. 286	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Rise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 12 Estimated gross annual revenue of your entire company/institution: (check one only)

- |  |  |  |
|--|--|--|
| 1. <input type="checkbox"/> \$10 billion or more             | 4. <input type="checkbox"/> \$100 million to \$499.9 million | 7. <input type="checkbox"/> \$5 million to \$9.9 million |
| 2. <input type="checkbox"/> \$1 billion to \$9.9 billion     | 5. <input type="checkbox"/> \$50 million to \$99.9 million   | 8. <input type="checkbox"/> \$4.9 million or less        |
| 3. <input type="checkbox"/> \$500 million to \$999.9 million | 6. <input type="checkbox"/> \$10 million to \$49.9 million   | 9. <input type="checkbox"/> None of the above            |



1. FOLD HERE & MAIL TODAY



3. PLEASE TAPE HERE



2. FOLD HERE & MAIL TODAY



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**

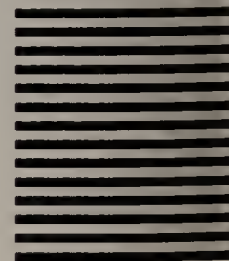
FIRST-CLASS MAIL PERMIT NO 1752 NORTHBROOK IL

POSTAGE WILL BE PAID BY ADDRESSEE

**NetworkWorld**

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

PO BOX 3091  
NORTHBROOK IL 60065-9928





**Covering:** Local and Long-Distance Services • Value-Added Networks • Cable, Satellite and Wireless Networks • Regulatory Affairs • Carrier-Based Internet Services

## Briefs

■ **America Online** is getting into the phone business. The company confirmed last week that its 6 million members will be able to talk to each other over AOL's private managed network using AOL-provided **telephony software** for their PCs by the end of the year.

Pricing is not available yet. The service does not extend beyond the AOL network, but the company confirmed it is working on expanding its telephony capability to the Internet.

■ **Telstra**, the Australian telecommunications authority, has launched a public network service based on Release 4 of Lotus Development Corp.'s **Notes** groupware. Similar Notes services have been announced or are already available in the United States, Europe and Japan.

■ **The Federal Communications Commission** appointed 30 individuals to the new **North American Numbering Council (NANC)**. Under a July 1995 FCC ruling, the NANC will select a neutral organization to take over administration of the nation's telephone numbers, a job still held by Bellcore despite its 3-year-old request to shed that responsibility.

■ **US WEST, Inc.** added its name to the roster of local carriers **suing the FCC** to overturn substantial portions of its local network interconnection order. Under the FCC rules, "US WEST will be required to sell all the parts of our network to competitors at below-cost rates," complained Richard McCormick, US WEST chairman.

■ **Global One**, the joint venture of Sprint Corp., France Telecom and Germany's Deutsche Telekom, **appointed Viesturs Vucins president and CEO**. Vucins is a former president of the AT&T-led Unisource and Uniworld joint ventures.



## AT&T offers bundled govt. discount

*International traffic, 800 lines trigger 35%-off deal without volume requirements.*

**By David Rohde**  
Washington, D.C.

AT&T has developed a service to help government users deal with soaring international call volume and growing demand by citizens to reach agencies via toll-free numbers.

Without fanfare, the carrier

late last month introduced the Government Worldwide Intelligent Network (GWIN). The service combines a raft of AT&T domestic and international offerings employed by government users into a simplified discount billing plan.

GWIN resembles AT&T's popular UniPlan for commercial users. UniPlan aggregates out-

bound and inbound domestic calls plus international calls onto a single bill and then applies higher discounts for higher overall volumes. GWIN also aggregates overall calling volume, but the difference is that GWIN users get a straight 35% discount

regardless of overall volume.

Both UniPlan and GWIN include users' switched and dedicated access locations. As a result, even smaller agency locations that cannot justify a T-1 dedicated access line to the nearest AT&T point of presence can have their calling volume included in the GWIN discount.

GWIN plugs a hole in the gov-

ernment's Federal Telecommunications System (FTS) 2000 contract, which does not extend to international circuits, explained Larry Cunningham, an AT&T offer manager for the carrier's Government Markets Division here.

Many federal agencies now experience a surge in calling volume following international military and diplomatic incidents, Cunningham said. And U.S. agencies are increasingly establishing inbound call centers, with some of them using their

*See GWIN, page 36*

### All day, every day, rates

**Prices for all domestic outbound calls under Government Worldwide Intelligent Network:**

Access method	Nominal price	Price after 35% discount
Dedicated access to AT&T POP	13.1 cents per minute	8.5 cents per minute
Local telco switched access	16.7 cents per minute	10.9 cents per minute

Prices apply regardless of mileage, time of day or total volume. Initial-minute prices after the discount are about a penny higher.

SOURCE: AT&T, WASHINGTON, D.C.

## MCI services on one big bill

**By Tim Greene**  
Washington, D.C.

At the beginning of next year, the phone bills of MCI Communications Corp.'s biggest corporate customers will have a whole new look.

Based on the company's Horizon billing platform, MCI will be able to format the bills and deliver them on the schedule the customer wants.

Horizon, a client/server system, taps data formerly collected and stored in individual billing systems for individual services.

The platform basically lets MCI produce one bill combining whatever services the user has bought from MCI: long distance, virtual network, 800 numbers and ISDN.

Horizon catapults MCI ahead of long-distance competitors AT&T and Sprint Corp., both of which are working on their own advanced billing platforms, according to Rob Rich, chief telecom analyst at The Yankee Group in Boston. Rich said AT&T and Sprint are not far behind. "MCI is ahead, but not as far ahead as they think," he said.

For routine billing, users will be able to get bills based on their own schedules rather than those established by MCI. That way, a company that wants bills on a 90-day cycle, for example, can get one bill instead of three monthly bills. And MCI will guarantee that the user will get that bill within 10 days of the end of a billing cycle.

Horizon makes improvements on the current system of billing by adding a graphical

user interface (GUI) for MCI employees to enter customer service, pricing, billing and reporting arrangements. The lack of a GUI slowed down the provisioning of services.

Rich said he was impressed that MCI incorporated Microsoft Corp.'s Windows NT into Horizon. Most carrier billing sys-

### What's on the Horizon?

**MCI's new Horizon billing platform will:**

- ▶ Offer customized billing formats
- ▶ Provide real-time billing data
- ▶ Guarantee bills within 10 days of the end of the billing cycle
- ▶ Make a single bill for all services the user buys from MCI

tems have been based on proprietary systems.

"That's especially interesting. It's the first large-scale implementation of it I've seen," he said.

In addition to the benefits Horizon might bring to users, it will also give MCI a boost by making it easier to set up new service offerings. Such provisioning, which now takes four to six months, will be reduced to nine weeks by Horizon, according to MCI.

As MCI tries to expand into local services, Horizon will come in handy because it is flexible, Rich said. For example, MCI now resells wireless service, which means it does not have control over the billing system for that service. But with Horizon, MCI can still integrate the wireless

*See Horizon, page 36*

## MCI snares Defense contract

**By David Rohde**  
Washington, D.C.

MCI Communications Corp. has smashed a big hole in AT&T's dominance in day-to-day Department of Defense communications by winning a major Pentagon contract.

The No. 2 carrier recently was awarded the Defense Informa-

The equipment itself will come from a group of SNET equipment subcontractors. Notable among them are Northern Telecom, Inc. and Tellabs Operations, Inc., which are already working to upgrade MCI's U.S. backbone network to speeds as high as OC-12, or 622M bit/sec.

### MCI gets piece of the pie

**The initial components of the Defense Information Systems Network are as follows:**

Contract	Date awarded or to be awarded	Winner
Global support services	June 1996	Boeing
Network switching and bandwidth mgmt.	Sept. 1996	MCI
Transmission services	Late 1996	To be announced
Video services	Late 1996	To be announced

tion Systems Network (DISN) switching infrastructure and bandwidth management contract.

Under the nine-year deal, MCI will provide Synchronous Optical Network (SONET) digital cross-connects, central office-class switches and other gear for the Defense Department's new OC-3, or 155M bit/sec, backbone, which links several hundred U.S. locations.

Once installed, the network will be managed by MCI for the DISN, a long-awaited consolidation of disparate Defense Department networks that have grown up over the years.

The contract win is especially significant for MCI because among the networks the DISN will replace is AT&T's Defense Commercial Telecommunications Network. That contract is

*See Defense, page 36*





BEFORE YOU CAN CONTROL  
YOU NEED MANAGEWISE TO PUT IT



YOUR WHOLE NETWORK,  
IN PERSPECTIVE.



Today's networks are complex by nature, which make them a perfect environment for ManageWise.™

Whether your network consists of NetWare® servers, Windows NT™ servers, OS/2® Warp clients or Windows® desktops, ManageWise keeps an eye on it all. Its easy-to-use interface helps you proactively manage and plan your entire network's growth—including your intranet and the Internet. ManageWise sees

farther than other solutions, by alerting you of network bottlenecks, detecting user printing problems, and updating application access rights.

It even lets you send applications from your desktop to individual users, reducing support costs.

For more details on our latest release, ManageWise 2.1, visit us at [www.novell.com/managewise/](http://www.novell.com/managewise/) or call 1-800-665-4586 for your nearest Novell Platinum or Gold Partner<sup>SM</sup>. And bring your entire network into sharper focus.

[www.novell.com/managewise/](http://www.novell.com/managewise/)

ManageWise

**Novell**<sup>®</sup>  
Everything's Connected<sup>™</sup>



## Horizon

Continued from page 33

portion of the bill based on whatever information it receives from the wireless resellers it deals with.

That flexibility will also be valuable in billing MCI customers for local services that MCI buys from local exchange carriers. "The systems can be not tightly integrated but still interoperable," Rich said.

Currently, MCI does not have a specific plan for incorporating Horizon features into MCI's international Concert services. That is because MCI's partner in Concert, British Telecommunications plc, does not have the Horizon platform. However, because BT lacks any such advanced billing platform, it might adopt elements of Horizon for its own use as well as for Concert, according to Joe Zaccari, MCI's vice president of IT business development. ■

## Defense

Continued from page 33

based on AT&T T-1 and T-3 circuits and carries a big chunk of Defense Department voice and data traffic. The Defense Department has long cited its need for additional bandwidth to carry the amount of traffic it generates.

AT&T is by no means out of the ball game yet, though. The contract that MCI won does not actually include the OC-3 transport circuits, just the switching and bandwidth management. The Defense Department intends to award the transmission contract late this year as part of a four-pronged strategy to generate maximum competition among potential vendors (see graphic, page 33).

MCI agreed to establish a dedicated 7x24 network management center for the DISN using the NetExpert network management system from Objective Systems, Inc. The carrier's \$88 million bid was well below other carriers' bids, but MCI was told it won the contract equally because of price and technical considerations, according to Diana Gowen, MCI's director of Defense Department sales and marketing.

## Government protesters

Government contract awards are subject to protest by the losers — in this case AT&T and a partnership between Sprint Corp. and EDS Corp. AT&T officials said they would decide whether or not to file a protest following a mandatory debriefing by the Defense Information Systems Agency (DISA).

The contract award comes even as AT&T continues to introduce new service packages to both civilian and military agencies, such as the new Government Worldwide Intelligent Network (see story, page 33).

MCI officials said they were prepared to help DISA defend its decision against a protest by AT&T, which they considered far more likely than a Sprint protest.

"I think if I were AT&T, I'd have to do something," Gowen said. "It's hard to walk away from something this big." ■

## GWIN

Continued from page 33

800 or 888 numbers as a way for citizens and military personnel to call back home.

Subject to procurement rules, federal agencies that are assigned either to AT&T or Sprint Corp. under FTS 2000 — or those that do not use FTS 2000 at all — can subscribe to GWIN. But federal agencies are not the only ones eligible for

GWIN, Cunningham said. A broad range of government users can subscribe, including state agencies, U.S. embassies of foreign governments and multilateral organizations such as the World Bank and the United Nations.

Still, the new service is not the ideal plan for every government agency, Cunningham conceded. The 35% GWIN discount brings domestic dedicated access interstate rates below 9 cents per minute

(see graphic, page 33). But GWIN rates are still higher than FTS 2000 for straight outbound domestic phone calls; a major renegotiation last year brought many FTS calls below 5 cents per minute.

And other than some calling card privileges, GWIN does not yet incorporate the virtual private network features — such as call screening and abbreviated dialing — found in AT&T's Software Defined Network and competitors' VPNs. ■

# It's Open. Integrate Customizable. 3-D.

No matter what type of applications you're creating, the CA-Unicenter® TNG™ SDK is the place to start.

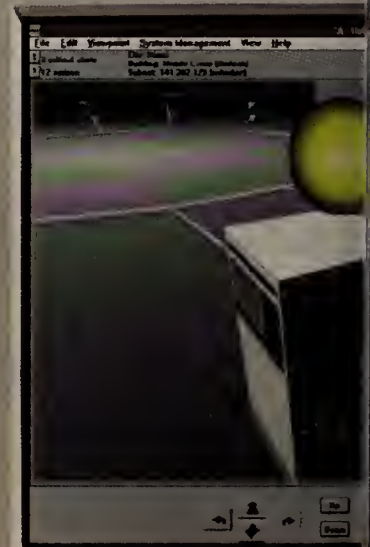
Because right out of the box, this SDK gives you the freedom to create more powerful and robust applications—in a fraction of the time. It has everything you need to customize and build total network and systems management solutions.

It can be totally customized and the 3-D, Real World Interface™ can even reflect your exact physical environment. It's totally extensible and based on a proven, object-oriented infrastructure. And it's the first comprehensive, End-to-End Management solution that integrates all your systems, networks, databases and applications. There are even intelligent agents, managers and complete application instrumentation, too.

With the CA-Unicenter TNG SDK, you can quickly and easily integrate your applications to give your clients a totally integrated, proven management suite that includes security, backup, performance, software distribution and configuration. This SDK can greatly reduce your development cycle, while helping you avoid the risk and costs associated with trying to build your own infrastructure.

There are a million ways that CA-Unicenter TNG SDK can help you and your clients, but it can't do anything unless you call. Pick up the phone and call right now.

**20<sup>th</sup>**  
anniversary  
**COMPUTER ASSOCIATES**  
Software superior by design.





# Sprint fine-tunes frame relay management

Forms partnership, launches real-time customer management service, CD-ROM version on its way.

By Joanie Wexler

Kansas City, Mo.

Customers of Sprint Corp.'s Frame Relay Service that recently gained a tighter grip on the management reins of their networks will soon have an option for even

more control.

Through a partnership with Visual Networks, Inc., Sprint has added a service option to its frame portfolio called Visual UpTime Analysis Service Element. Sprint is offering the option of bundling Visual's

managed DSU/CSU, which contains net monitoring and analysis software and a separate hardware probe (see story, page 27), into its frame relay service.

The offering complements what users of Sprint's Frame Relay Service already

get as part of the basic package: monthly reports of network performance to help them spot network trends and tweak their net configurations accordingly. Currently, they see summaries, based on data collected every 15 minutes throughout the month, of the number of frames in and out, the number of frames discarded and how long it takes frames to get from point to point. This information is presented in a summary for the overall network, and per permanent virtual circuit (PVC) and port, said Jack Tozier, frame relay product manager at Sprint.

Now users of the Visual option — which also requires a \$20,000 database server that includes server and client software (see graphic) — see real-time statistics, including what percentage of the overall traffic a given protocol accounts for at any point in time. They also see end-to-end delay for a given PVC measured in milliseconds, said Brad Hokamp, Sprint's director of data product management.

## The price of information

**Sprint's real-time monitoring option, where users can purchase or rent the equipment with software, costs 20% more than Sprint's basic frame relay service, according to the company.**

**Here's the breakdown of what you need:**

- ▶ DSU/CSU and probe, which stores two days' worth of data: Price is \$800 for a 56K bit/sec link, \$2,800 for a T-1 link.
- ▶ Database server, which includes the hardware and server and client software: \$20,000.
- ▶ Client software for monitoring workstation: Software price included with the server.

Even better news, he said, is that the company has a CD-ROM version in alpha test that packs even more granular information into users' hands. That version is due out this fall.

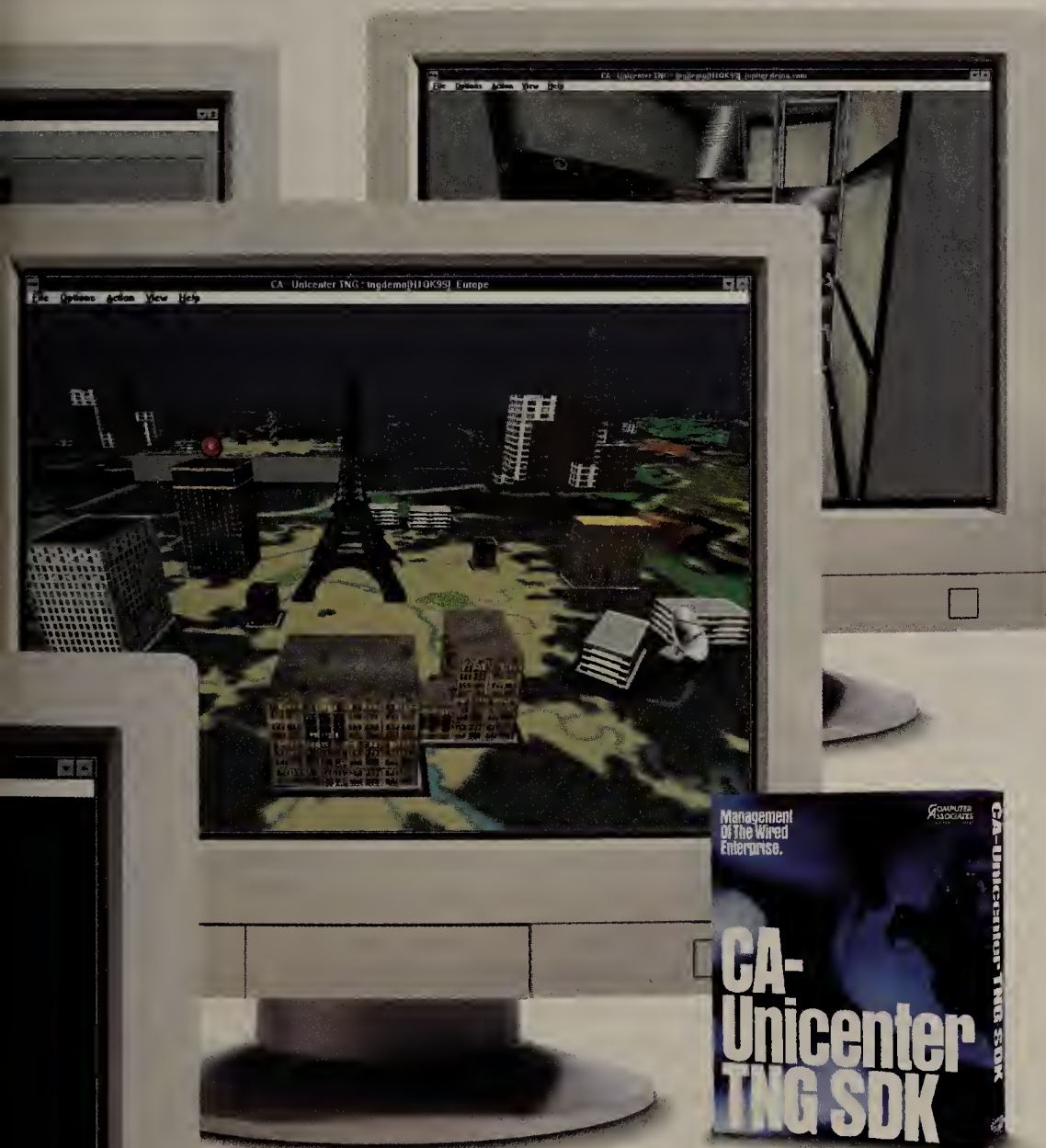
The moves signify an important trend: Carriers are beginning to place more useful and timely management information in the hands of large customers that want to retain a staff to plan and design the network, rather than leaving that up to the carrier.

For example, EMI Communications Corp., a regional interexchange carrier now owned by Intermedia Communications, Inc., in June launched Enhanced Customer View, a graphical monitoring and performance analysis tool. And LCI International, Inc. offers these capabilities plus the ability for customers to take action on their nets, say, by reconfiguring a committed information rate themselves.

As yet, though, "most [other carriers] don't offer any useful information to network managers," said Beth Gage, broadband consultant at TeleChoice, Inc., a consulting firm in Verona, N.J.

Users have had access only to monthly hard copy reports, which they had to specifically request, as with Sprint's existing offering. Measuring performance in minutes "isn't representative enough" for accurate trend analysis and network decisions, Gage said. "You need to get into milliseconds." ■

# d. Object-Oriented. Scalable. And **FREE!**



**Call 1-888-4TNGSDK to apply for a FREE CA-Unicenter TNG Training Seminar and a FREE CA-Unicenter TNG SDK. Or visit us at [www.cai.com](http://www.cai.com)**

## There's A TNG Seminar Near You.

Albany, NY	Nov. 18
Albuquerque, NM	Oct. 28
Atlanta, GA	Oct. 16
Bellevue, WA	Aug. 7
Birmingham AL	Oct. 11
Calgary, Alb., Can.	Dec. 3
Charlotte, NC	Oct. 21
Chicago, IL	Sep. 11
Cincinnati, OH	Aug. 15
Cleveland, OH	Dec. 10
Columbia, SC	Oct. 18
Columbus, OH	Aug. 12
Dallas/Ft. Worth, TX	Oct. 18
Denver, CO	Sep. 12
Des Moines, IA	Sep. 27
Detroit, MI	Dec. 5
Edmonton, Alb., Can.	Dec. 5
Houston, TX	Oct. 21
Indianapolis, IN	Sep. 9
Irvine, CA	Nov. 6
Jackson, MS	Oct. 15
Jacksonville, FL	Sep. 30
Jersey City, NJ	Nov. 13
Kansas City, MO	Oct. 1
Knoxville, TN	Oct. 11
Lexington, KY	Oct. 9
Little Rock, AR	Sep. 23
Los Angeles, CA	Nov. 8
Louisville, KY	Oct. 7
Memphis, TN	Sep. 25
Miami, FL	Oct. 4
Milwaukee, WI	Sep. 13
Minneapolis/St. Paul, MN	Sep. 16
Montgomery, AL	Oct. 9
Nashville, TN	Sep. 27
Norfolk, VA	Oct. 29
Oklahoma City, OK	Sep. 18
Omaha, NE	Sep. 25
Parsippany, NJ	Nov. 15
Philadelphia, PA	Nov. 11
Phoenix, AZ	Nov. 1
Pittsburgh, PA	Dec. 12
Portland, OR	Aug. 9
Raleigh/Durham, NC	Oct. 25
Richmond, VA	Oct. 31
Rochester, NY	Nov. 21
Sacramento, CA	Nov. 13
Salt Lake City, UT	Sep. 9
San Antonio, TX	Oct. 25
San Diego, CA	Nov. 4
San Francisco, CA	Nov. 15
San Jose, CA	Nov. 18
St. Louis, MO	Oct. 3
Tampa, FL	Oct. 2
Tucson, AZ	Oct. 30
Tulsa, OK	Sep. 20
Washington DC	Nov. 8
Wichita, KS	Sep. 16
Winnipeg, Man., Can.	Sep. 20
Winston-Salem, NC	Oct. 23



*Everyone said only a miracle  
could make ISDN simple.*



## *Introducing the world's simplest, smartest, fastest ISDN modem.*

The new ADTRAN Express XRT makes connecting to ISDN easier than ever before. The XRT eliminates the set up hassles that plague other ISDN modems. Our unique Express Configuration Wizard™ has patent-pending algorithms that automatically detect phone company parameters. All you need to know is your ISDN phone number and you're up and blazing on the Internet in minutes. To make it even easier, the whole process is delivered to you with a

familiar Windows 95 look and feel.

With Express XRT, easy connection is only the beginning.

- Ultra-high speed data rates up to 230,400 bps with compression.
- Two analog phone ports.
- Windows 95 Plug and Play.
- Remote configuration and diagnostics for easy connection to corporate networks.
- Supports your existing analog modem without requiring an extra COM port

(patent pending).

- Also available in an affordable data only model: Express XR™.

The Express XRT is everything you've been waiting for in an ISDN modem. But it's just what you'd expect from ADTRAN, the leading supplier of advanced ISDN technology to the telecommunications industry. If you want the speed of ISDN, but have been waiting for someone to make it simple, your prayers have been answered.

**ADTRAN**  
**EXPRESS XRT™**  
Get on with it.

**CALL 1-800-9ADTRAN FOR THE DEALER NEAREST YOU.**



# AT&T builds CDPD, but what is it good for?

*Carrier to add four new markets this year, strikes fourth inter-carrier agreement. But users need educating.*

By Joanie Wexler

Kirkland, Wash.

After missing earlier deadlines, AT&T Wireless Services, Inc.'s efforts to make Cellular Digital Packet Data (CDPD) a mainstream service have reached fever pitch, as the carrier is tirelessly bringing up new markets on the IP-based wireless net.

## IF THEY BUILD, HOW MANY WILL COME?

Despite CDPD's small base, GIGA's CDPD projections are bullish, citing broader coverage and price cuts.

CDPD installed base (in thousands)



SOURCE: GIGA INFORMATION GROUP, MORRISTOWNSHIP, N.J.

Still, AT&T and other cellular carriers have much work ahead of them before CDPD is a success. First, there is the emergence of personal communications services. Second, AT&T and others have failed to sell users on CDPD's benefits, observers said.

AT&T has been on a network expansion and carrier interconnection agreement spree. It recently announced that it has deployed its CDPD service in two additional cities: Tampa, Fla., and West Palm Beach, Fla. The company said it intends to offer commercial service in Fresno, Calif., and Orlando, Fla., in the third quarter, extending its total CDPD reach to more than 110 million people.

The company also said last week that it has struck its fourth intercarrier agreement — this time with Southwestco Wireless Cellular One, effective immediately. The deal stretches AT&T's coverage to El Paso, Texas; Albuquerque and Las Cruces, N.M.; and Phoenix and Tucson, Ariz.

AT&T has already inked intercarrier agreements — loosely called "roaming" or "visiting" agreements — with cellular heavyweights Ameritech Cellular Services, Bell Atlantic NYNEX Mobile and GTE Mobilnet.

The agreements mean that AT&T users can enter a partner's territory and continue to use the AT&T service, billed at the same rate on a unified AT&T invoice. Interconnection agreements among other carriers will operate the same way.

AT&T's continued investment in CDPD reflects "an incredible carrier commitment," which should ease user worries about providers backing away from the service, said Bill Frezza, president of Wireless Computing Associates, Inc., a consultancy in Yardley, Pa. Without broad coverage, CDPD will never make it big, he said.

But the carriers have other tasks they need to attend to.

"AT&T has still failed in its broad-scale education and justification of CDPD," said Ken Dulaney, vice president of mobile computing at Gartner Group, Inc. in San Jose, Calif. "Users still don't know what to do with it."

Dulaney and Frezza suggested that CDPD access to the Internet could help the cause. The months-old AT&T PocketNet Phone, a CDPD phone with a text display that runs HTML browser and application software from start-up Unwired Planet, Inc. in Redwood City, Calif., could encourage users to try CDPD, they said.

AT&T last month launched the AT&T PocketNet Phone Early Access Program, a

beta test for companies with mission-critical Internet/intranet applications requiring wireless access. An AT&T spokeswoman said AT&T has already signed up 38 customers, who are creating their own wireless Internet applications. She said half of the beta customers are Fortune 500 firms.

Among the testers is Royal Caribbean Cruises, Ltd., which is establishing real-time wireless ship-to-shore mainframe sessions to update its inventory database of on-board foodstuffs. And the AAA Auto Club South in Tampa is using the service to test a wireless automatic vehicle location system to more quickly attend to stranded motorists. ■

## AT&T disaster team recovers downed CO

By Tim Greene

Framingham, Mass.

A convoy of tractor-trailer trucks from a secret depot somewhere on the East Coast, each rig guarded by a two-man team in a pickup truck, rumbled into a parking lot here recently.

The trucks were met by a team of specialists, summoned from scattered locations across the U.S., who were waiting for clearance to deploy their gear at the local AT&T central office (CO).

The group and equipment were responding to a simulated disaster, a hypothetical fire that left the CO a smoking hole, totally unusable, and all of the CO staff dead.

When they deploy, the disaster recovery team hauls with it everything it will need, from tents and C rations to satellite dishes and a Bobcat tractor with trenching, bulldozer and forklift attachments.

Most of their gear is designed to reestablish contact between the AT&T long-distance network and the local exchange carrier network.

In a real disaster, this would be done by digging up the undamaged segments of cable trunks from both networks and replacing the down CO with equipment brought in by the team, plus a remote hot-standby 4ESS switch.

This standby switch can be loaded with switch settings for any of the 130 4ESSs in the AT&T network. Those settings are downloaded every 24 hours and kept on tape specifically to boot up the hot-standby in an emergency.

Key to CO recovery is the Fast Automatic Restoration (Faster) trailer, which houses technology that grabs hold of protection channels in the network that are reserved to relieve overloaded circuits or equipment failures. Faster, developed by Bellcore, can use those channels to



Jim Crosson, head of the team, works with a team member to make sure the gear is working properly.

restore 250 T-3 lines in less than five minutes.

While most of the circuits the team would restore would be for voice services, bringing the CO back up would also bring up data services and dedicated lines, according to James Crosson, AT&T's strategic planning manager for network disaster recovery.

"We'll restore what was in that building," Crosson said.

### On the scene

Last week, the team was still on the scene, going through the paces it would have to were there an actual disaster — such as a fire, hurricane or terrorism — that wiped out one of AT&T's switching hubs.

The disaster recovery team has been in existence since 1991, made up of 35 permanent members and 70 AT&T volunteers, who work in other capacities until there is an emergency.

While they have never been called on to restore a CO, their training prepares them to do so within 24 hours of arriving on the scene and assumes no assistance is available from the local CO staff.

Most recently, they set up satellite connections in Columbia, S.C., for the Red Cross to use in its rescue efforts after hurricane Edouard hit two weeks ago. Also, this year, the satellite unit established secure communications for the FBI's investigations of the bombing at the Olympics in Atlanta and the explosion that took down TWA Flight 800 in New York in July. ■



The AT&T disaster team deploys its central office on wheels during a simulated disaster last week.

# Look,

ALL the reasons you should call MAXNET won't fit in this ad...

We FOCUS on

ATM Switching

SNA over Frame Relay

Network Management

Remote Access

just to name a few.

We take a hard VIEW of new products from companies like

Cisco

3Com

Bay Networks

and help you make CLEAR decisions about their value in YOUR network.

Then we install and support your solutions with the most advanced services around:

Baseline Analysis

Enterprise Network Design

Remote Monitoring

24 x 7 Maintenance

Networking expertise is our product, and you can't fit that in a box...

CALL 1-800-4-MAXNET for the whole picture.

**MAXNET**  
communication systems, inc.  
Solutions for enterprise networking

Circle Reader Service #71



New Version

2.12

with 12 *new* enhancements  
including:

- ▶ Export to GIF and JPEG to create Web pages
- ▶ Completely Windows 95/Windows NT compatible

# INTENSE.

Effective operation of your enterprise network is mission critical. Effective documentation about your network is equally mission critical. NetDraw® and NetDraw Plus will help you diagram and document your network infrastructure quickly, effectively and professionally. In fact, NetDraw makes your diagrams intense.

NetDraw Plus v2.0 integrates a powerful, comprehensive library of over 1,100 highly detailed networking images into a robust Windows™ drawing application.

**Drag and Drop** the images you need right from the on-screen templates onto your drawing. In full color and richly detailed, NetDraw will help you prepare professional diagrams and presentations. Choose from hundreds of vendor-specific images or from hundreds more general network images and symbols. We even include complete map libraries to diagram your network geographically. **Over 1,100 total images!**

**SmartDrawings™** make the difference. All NetDraw images have intelligence built in. Preset line connect points, text handling and image sizing properties make drawing your network a snap. And since NetDraw remembers how your component images are connected, you can move them around without redrawing a single line! You can also easily customize all image properties to your own needs and specifications.

**Multi-Level diagrams** and topologies are no problem with NetDraw Plus. Define any image or symbol to link to any other NetDraw Plus diagram. And, NetDraw Plus supports Object Linking and Embedding so you can link your NetDraw diagrams to documents in other Windows applications.

Priced at just \$199.95, NetDraw Plus does more than just make your diagrams look good, it makes them intense.

**NetDraw** Clip Art for Building Networks®

If you already have a Windows drawing application or if you work on a Macintosh, you too can have the power of NetDraw. The complete 1,100 image NetDraw v3.0 clip art library is available separate from our NetDraw Plus application package. NetDraw for Macintosh comes in both EPS and AI formats and NetDraw for Windows comes in Windows Metafile format. Either way, NetDraw images are a breeze to import into almost all applications.

Available now for just \$129.95, the NetDraw clip art library provides you with the most comprehensive, highest quality collection of network images and symbols available.

**Order your copy today!**

**800-643-4668**  
OR (508) 820-7493

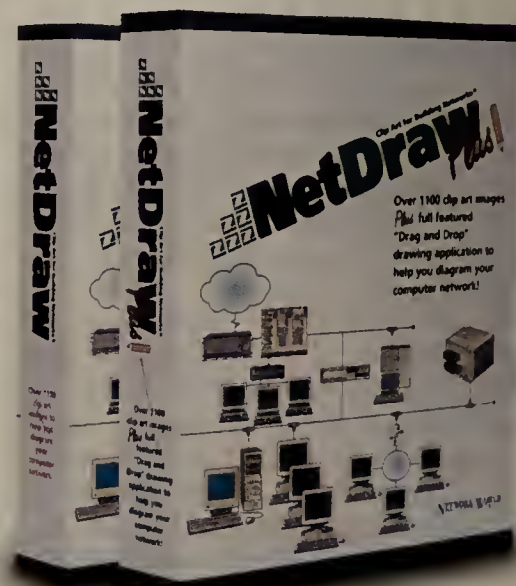
Dial our **Fax-Back** information line at 800-756-9430 for complete product information and an order form! (When prompted, request document #10)

E-mail your request for complete information to [netdraw@idg.geis.com](mailto:netdraw@idg.geis.com).

**NetworkWorld**

IDG  
The World of Information Technology

Network World, Inc., 181 Worcester Road, Framingham, MA 01701-9172. NetDraw® is a registered trademark of Network World, Inc. SmartDrawings™ is a registered trademark of SmartDraw Software, Inc. All other brand or product names are trademarks or registered trademarks of their respective holders.





# Local Networks

**Covering:** Operating systems • LAN management  
Hubs • Switches • Adapters and other equipment

## Briefs

■ **Fibre Channel provider Ancor Communications, Inc.** this week will demonstrate a **Gigabit Ethernet network** at NetWorld+Interop 96 in Atlanta. The demo will consist of Sun Microsystems, Inc. and IBM workstations on Ethernet and Fast Ethernet segments, which are connected to a switched Gigabit Ethernet backbone via a 10M/100M/1,000M bit/sec Ancor Gigabit Ethernet switch prototype. Ancor will extend its product line of Fibre Channel switches and adapters to include Gigabit Ethernet gear.

Ancor: (612) 932-4000.

■ **Fluke Corp.** this week will release a handheld tool for verifying network connections and diagnosing problems on **10M/100M bit/sec Ethernet networks**. Fluke OneTouch Network Assistant uses an icon-based interface and a touch-



sensitive screen, allowing network administrators to monitor collision and utilization rates, errors and broadcasts. OneTouch can also alert administrators if collision or utilization rates exceed predetermined levels.

Fluke: (206) 356-5500.

■ **Computer graphics vendor Intergraph Computer Systems, Inc. (ICS)** last week announced that it has created the **ICS Server Division**, which will be focused on developing **servers for the Windows NT market**. The new business unit will be headed by Lee Hanson, executive product director at Intergraph.

Hanson was formerly an executive with Sun Microsystems, Inc.

ICS: (800) 763-0242.

## NT Server to support video broadcasts and conferencing

By Christine Burns  
Atlanta

Microsoft Corp. this week is expected to announce several

stored in a synchronized multimedia stream.

The server component of  
See NT video, page 44

### BRINGING WINDOWS NT TO LIFE

The Active MovieStream Editor is one of the multimedia network capabilities Microsoft will roll into Windows NT Server by year-end.



Windows NT Server-based tools and services for delivering live and on-demand multimedia content across a network.

These tools and services — collectively known as NetShow — will enable companies to build and run multimedia applications such as collaborative conferencing and telephony, live broadcasts of company events and training sessions.

NetShow will be among the products discussed here this week at NetWorld+Interop 96 by Jim Allchin, senior vice president of Microsoft's Desktop and Systems Business Division.

NetShow is in beta but will be packaged with Microsoft's Internet Information Server and shipped in the Windows NT Server 4.0 box before the end of the year.

Each NetShow component incorporates the ActiveMovie streaming format (ASF), Microsoft's proposed standard format for storing and transmitting multimedia content throughout a corporate intranet. The format, published by Microsoft in March, allows data objects, such as audio objects, video objects, still images, URLs and HTML pages, to be combined and

## Server offerings challenge price/performance front

Hewlett-Packard, Dell introduce new server families.

By John Robinson

Attention server shoppers: Two companies have announced new product lines each claims will redefine pricing levels industrywide.

Hewlett-Packard Co. this week will introduce a line of enterprise servers running the 64-bit HP Precision Architecture (PA)-8000 RISC processor with performance levels and prices it boasts will shatter entry-level to high-end classifications.

Separately, Dell Computer Corp. has introduced a line of Pentium Pro servers with prices as much as 30% below the competition's, the company said.

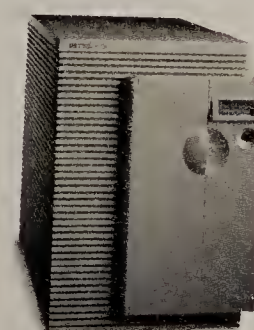
The new HP server family is

led by the mid-range HP 9000 K-Class, which the company is pitting against high-end servers from companies such as Digital Equipment Corp. and NCR Corp.

The 9000 K-Class servers run the HP-UX 10.2 operating system and come in four models, ranging in price from \$52,200 to \$77,200. The K250 and K260 models support up to 2G bytes of memory and feature four ISA slots, one PCI slot and 3.8 terabytes of disk storage. The

K450 and K460 models support up to 4G bytes of memory and feature eight ISA slots, five PCI slots and 8.3 terabytes of disk storage.

See Server, page 44



The HP 9000 K-Class is the first offering in HP's new server family.

## SMC drives down cost of Fast Ethernet

By Jodi Cohen

A pair of LAN switch vendors last week threw down the price gauntlet in an effort to make shared Fast Ethernet and switched Ethernet more attractive to customers.

Standard Microsystems Corp. (SMC) bolstered its Fast Ethernet product line with 100M bit/sec hubs that start at less than \$150 per port.

Separately, Optical Data Systems, Inc. (ODS) rolled out switched Ethernet modules for its flagship Infinity switching hub that are the same price as the company's shared Ethernet offering. The new modules will be on display at this week's NetWorld+Interop 96 show in Atlanta.

The highlight of SMC's new Fast Ethernet gear is the Tiger-

Stack 100 family of hubs, which is at heart a shared LAN offering that allows customers to plug in a module to take advantage of switching, too.

The TigerStack 100 Fast Ethernet hubs come in 12- and 24-port versions, and can be stacked up to eight units high to support as many as 192 ports. The hub supports an integrated switch module that interconnects shared Fast Ethernet segments, eliminating the need for a costly external 100M bit/sec Ethernet switch.

The TigerStack 100 hubs support Remote Monitoring and can be managed through any SNMP-based platform.

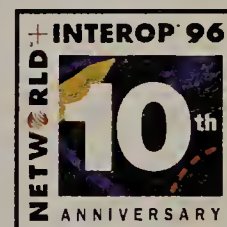
SMC rounded out its Fast Ethernet product suite with an eight-port Fast Ethernet hub as well as an eight-port autonegotiating 10M/100M bit/sec Ethernet switch.

Analysts said that SMC's aggressive pricing may be just the boost that the shared Fast

See Switch, page 44

### Ethernet/Fast Ethernet product blitz

Vendor/Product	Price	Availability
<b>Standard Microsystems</b>		
TigerStack 100 hub, a 100Base-T hub in 12- and 24-port versions	\$1,990 and \$3,590, respectively	September
TigerSwitch 100, an 8-port Fast Ethernet switch	\$6,400	November
EZ Hub 100, an 8-port Fast Ethernet repeater	\$890	October
<b>Optical Data Systems</b>		
32-port Ethernet switch module	\$7,390	Now
24-port Ethernet switch module with two Fast Ethernet uplinks	\$9,100	Now
12-port Fast Ethernet switch module	\$7,200	Now





**There's  
really  
only  
one  
thing to  
remember  
about  
optical  
fiber.**

**In the  
world  
of glass  
technology,  
nobody  
beats  
Corning**

**ns Corning® Fiber**

**Contains Corning® Fiber**

**nobody.**

**CORNING**



# McAfee finds NT niche with suite

By John Robinson

Santa Clara, Calif.

McAfee this week will introduce a self-centered approach to network management that integrates the company's security, antivirus and help desk offerings into a single product suite optimized for Windows NT networks.

McAfee Enterprise, or ME, marks the company's first solid foray into NT net-

such as help desk and asset management tools, the collection also includes a new family of security applications.

McAfee Secure Web includes WebWall, a packet-filtering firewall, and WebID, a user authentication and certificate management module. ME also features McAfee Secure 1, which comprises the company's VirusScan offering and WebCrypto and NetCrypto encryption products.

Although ME is optimized for NT, NetWare users said that fact would not dissuade them from migrating to the network management suite.

Diane DelVecchio, a consultant who oversees a NetWare 4.1 WAN comprising 850 nodes on 25 servers for Smith Environmental Services in Plymouth Meeting, Pa., said ME will give her the management solution she needs — all under one umbrella.

"While it consists of separate components, the whole thing can be administered on one console," DelVecchio said. "It gives my network administrators one place to look, one place to point and one place to click. [Other management] solutions have always been kind of piecemeal."

ME begins shipping this week. A 1,000-node site license subscription is priced at \$125 per node. The WebWall and WebID components will begin shipping in the fourth quarter.

©McAfee: (408) 988-3832.

## A look inside ME

McAfee Enterprise (ME) incorporates all the company's security, antivirus and help desk products into one net management suite.

Product	Modules
McAfee Secure-1	VirusScan; NetCrypto; WebCrypto
McAfee Secure Web	WebWall; WebShield; WebID
NT-ssential	NetShield; Backup Executive
McAfee Service Desk	Remote Desktop 32; Saber LAN Workstation; Vycor Enterprise

work management and culminates three years of acquisitions and product development. Network managers access ME applications via a console running Windows NT 4.0 and Microsoft Corp.'s Internet Explorer Web browser. It uses Microsoft's Distributed OLE and ActiveX controls for drag-and-drop functions. Although the bulk of the management suite consists of McAfee products already on the market,

# Lucent helps users cross wireless bridge

By David Rohde

Atlanta

Lucent Technologies, Inc. this week will attempt to revitalize the lackluster wireless LAN market by providing a migration path to the emerging new standard for the technology.

At NetWorld+Interop 96, the AT&T spin-off will debut a bridge between standard Ethernet LANs and wireless LANs designed to ease migration to the long-awaited IEEE 802.11 standard, which is expected to be finalized next year.

The 7- by 10-in. WavePoint II bridge contains two PCMCIA-based radio frequency network interface module slots. In initial implementations, network managers can install Lucent's proprietary WaveLAN interface cards into either or both PCMCIA slots, providing wireless connections to desktop or notebook PCs equipped with radio receivers.

Then, when the IEEE standard is finalized, Lucent will make available 802.11-compliant cards for users to swap out without having to buy new boxes, explained Jan Haagh, Lucent's product manager for WavePoint II.

At that point, Haagh expects most customers to keep one proprietary and one standard card in the bridge, enabling a gradual move to the new standard with no disruption of current applications. "That

way, all the users do not have to throw away their cards," Haagh said.

The standards-based card will probably go into the bridge's 2.4-GHz slot, where 802.11 activity has focused since many countries' regulatory agencies have allocated the spectrum for unlicensed industrial, scientific and medical usage.

Haagh cited hospitals, universities, hotels and retail locations as prime prospects.

## Ethernet in, wireless out

### Examining the WavePoint II bridge

#### Ethernet side:

- ▶ Supports 10Base-T or 10Base-2 media
- ▶ Handles peak data rate of 10M bit/sec

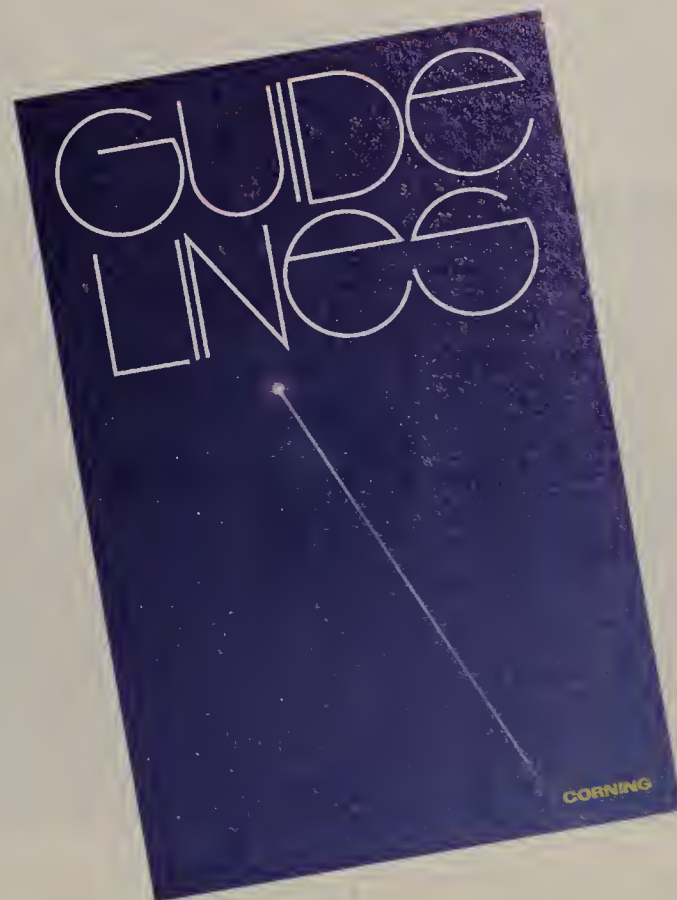
#### Wireless side:

- ▶ Includes radio frequency interfaces of 915 MHz and 2.4 GHz
- ▶ Handles peak data rate of 2M bit/sec per interface
- ▶ Boasts physical range of 200 to 800 feet
- ▶ Supports 30 to 120 users per interface

Because the range of each bridge is limited, users may have to purchase several, or even dozens, of the devices. Available in November, the base unit will cost \$1,295 and the interface cards will be priced at \$695 each.

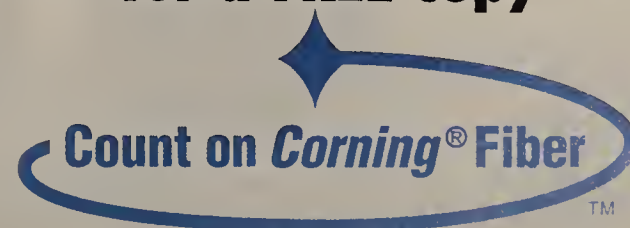
©Lucent: (888) 458-2368.

**GuideLines  
Classics.  
It's what you  
need to know  
about optical  
fiber  
networking!**



Let Corning help you with your most important LAN decision — the medium you choose for your network signal transmission. Our Guidelines® Classics, the best of our Guidelines magazine presents landmark articles on the development and evolution of optical fiber, the medium of choice for high performance private networks. This collection includes articles on fiber performance in a wide range of installations. Glass optical fiber's unique benefits, unavailable with other transmission media are demonstrated throughout this compendium that's yours free just by calling.

**1-800-525-2524, ext. 965  
for a FREE copy**



<http://usa.net/corning-fiber/>



## NT video

Continued from page 41

NetShow takes ASF files stored on an NT Server machine, packetizes them and then meters how they are sent over the network. This ensures consistent, high-quality delivery to the end user.

On the client side, NetShow includes Microsoft's ActiveMovie Stream Editor, a graphical authoring tool for creating ASF

multimedia files. The product will also ship with a set of ActiveX controls, which can be integrated into both on-demand multimedia applications and Web pages that automatically request delivery of multimedia files from the streaming server.

In its first iteration, NetShow will support multicasting of synchronized audio and data files, and will provide on-demand retrieval of audio, illustrated

audio and video files.

Live video content will be supported in a future version, said Jim Durkin, product unit manager within Microsoft's network multimedia division.

Microsoft will provide a set of basic administration and diagnostic tools that will help administrators monitor performance and schedule the distribution of multimedia files.

©Microsoft: (800) 426-9400.

## Switch

Continued from page 41

Ethernet market needs.

"The shared 100M bit/sec Ethernet market has slowed recently," said Tam Dell'Oro, president of Dell'Oro Group, Inc., a consultancy in Portola Valley, Calif. "People are developing the attitude that shared is out and switched is in, but both have a place in the network."

Shared Fast Ethernet is a good choice for networks with a large number of stations contributing more than 10M bit/sec of traffic during peak periods. Switched Ethernet, however, is appropriate when most stations are contributing 10M bit/sec or less of traffic and the user is experiencing media congestion.

Not to be left out, ODS rolled out a 32-port Ethernet switch module for its Infinity switching hub that is priced at \$230 per port, which is the same price as ODS' shared Ethernet switch module.

In addition, ODS unveiled a 24-port Ethernet switch module with two Fast Ethernet uplinks as well as a 12-port Fast Ethernet switch module.

All devices provide wire-speed performance and support all nine RMON groups.

©SMC: (516) 273-3100; ODS: (214) 234-6400.

## Introducing...

*The latest advance in strength, accessibility and space savings.*



## LANSCAPE™ Organizer 3000

your total solution for high density organization

LAN•SCAPE 'lan-skāp\': a cluster of computer networking equipment commonly referred to as a computer room, LAN lab, workstation or network operating center.

Ergotron's new LANSCAPE Organizer 3000 systematically organizes your equipment, regardless of size or location. Stylish, rugged construction organizes over 3,000 lbs. of hardware in less than eight square feet — maximizing component accessibility in a minimum footprint.

Customize your LANSCAPE Organizer from a comprehensive family of modular components that you can configure and reconfigure to meet your needs today and in the future.

Components are certified to meet or exceed ANSI/BIFMA furniture standards. In fact, independent testing facilities have found our 60" and 72" Server Shelves exceed performance standards by over three times.

Unlike competitive offerings, Ergotron's family of LANSCAPE Organizers offer you the option of patented ergonomic Monitor Suspension Technology. This feature accommodates many legislative and corporate ergonomic, health, comfort and safety initiatives. It also preserves surface and shelf space.

For details contact Ergotron,  
1-800-888-8458  
612-681-7600  
<http://www.ergotron.com>



**New 2" x 4" DuraFrame™** construction provides dead load strength to support up to 3,000 pounds.



**New Cantilever Work-surface Bracing** combines style with 12 gauge strength to hold up to 1000 pounds.



**New End Panels** add strength and are a stylish option for closure and privacy. Air flow perforations help prevent equipment overheating.



**New Quik-Touch™ Cable Management** provides hinged one-touch access.



**New Tilttable Server Shelves** — easily and safely angle monitors up to 15°.

**ERGOTRON®**  
Engineered for the human factor



## Server

Continued from page 41

Each 9000 K-Class is designed for symmetric multiprocessing (SMP) and supports as many as four processors. All are available now.

In October, HP will begin shipping its entry-level HP 9000 D-Class servers, which function primarily as Internet or Web servers and perform NFS applications. Two models will be available, with prices starting at \$22,260. On the high-end, HP next year will release the T600, which supports up to 12-way SMP. It is designed for online transaction processing.

Dell is waging its price/performance battle on the Pentium Pro front. The company last week introduced the single-processor PowerEdge 2100, its entry-level server available with a 180-MHz or 200-MHz Pentium Pro CPU and up to 256M bytes of ECC system memory.

The 180-MHz version, with 32M bytes of memory, a 2G-byte hard drive and a 3Com Corp. 10M/100M bit/sec Ethernet network interface card (NIC) is priced at \$3,799. It features three PCI slots and three EISA slots for NIC expansion, and ships with Intel Corp.'s Server Manager package. Dell is attacking the server market with the same tactics it used to tackle the desktop market — undercutting the competition's prices, analysts said.

In November, Dell will ship the dual-processor PowerEdge 4100 with a PCI RAID controller. Later this year or early next year, the company will launch the PowerEdge 6100, which is capable of supporting as many as four 200-MHz Pentium Pros and up to 2G bytes of memory.

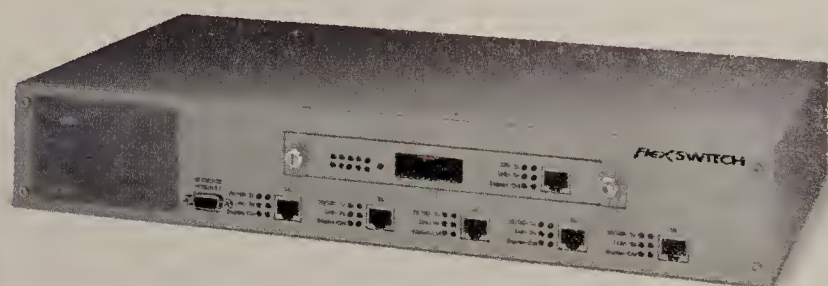
©HP: (415) 857-1501; Dell: (800) 289-3355.



# Flexible Switching and Internet Access



**FlexSWITCH Base Unit  
5 Switched 10/100 Ports**



**FlexSWITCH Base Unit with  
100Base-FX or 100Base-TX Uplink**



**FlexSWITCH Base Unit  
with 8 Switched 10M Ports**



**FlexSWITCH Base Unit with  
ISDN Internet Access Router**

## **FlexSWITCH** by D-Link

Whether you're looking for 10, 10/100 or straight 100 switching, FlexSWITCH is the switch for you. FlexSWITCH provides five 10/100 fixed ports and features optional 10 and 100 Mbps modules for scaleable expansion. So, you get the increased bandwidth you want now. And the additional switched ports you need later.

When you're ready for the Internet, make your multi-user connections simple with the FlexSWITCH ISDN module. With a two-channel BRI standard interface, FlexSWITCH connects you to the Internet at speeds up to 128Kbps. And

for those needing even greater throughput, there's data compression to boost speeds up to 512Kbps.

Performance and flexibility you'd expect from a chassis-based product. For the price of a workgroup switch. The New FlexSWITCH from D-Link. Call today!

**1-800-326-1688**

[www.dlink.com](http://www.dlink.com)

**D-Link®**  
Commitment to Connectivity





# Beta users contend OS/2 Warp Server SMP screams

By Christine Burns

IBM is hoping to make a big splash later this month when it officially rolls out a symmetrical multiprocessing (SMP) add-

on for OS/2 Warp Server 4.0.

Users are demanding SMP capabilities from PC server operating system vendors to accommodate a growing number of

network users and to better serve up processor-intensive applications.

Beta testers were eager to say that Big Blue's SMP option is definitely running way ahead of the pack.

"It's incredibly fast, and I haven't run into any constraints or been able to lock it up in any way," said John Robinson, systems manager of the South Carolina Department of Recreation and Tourism. He tested the SMP software on an IBM

Model 720 six-way processing machine running Lotus Development Corp.'s Notes, file and print services, and IBM DB2.

Impressed with the consistent load-balancing capabilities, Robinson plans to replace five single-processor network machines with the six-way server currently running the SMP test bed.

"With that consolidation, I get the speed, a single point of control and a cost savings by only maintaining one machine," he said.

Jason Gottschalk, owner of SYO Computer Engineering in Utica, Mich., is running a dual 166-MHz processor machine,

## SMP revisited

**IBM says the symmetric multiprocessing in OS/2 Warp Server 4.0 will be two to three times faster than that of OS/2 LAN Server 2.11. Here's why:**

- ▶ Scheduling and dispatching has been improved with support for multiple Pentium Pro processors
- ▶ File system has been optimized to support raw I/O for running database applications
- ▶ Memory management has been upgraded to support up to 4G bytes of virtual memory
- ▶ Performance analysis tools have been enhanced
- ▶ TCP/IP support provides faster response to client requests

which is serving file and print and Notes to 75 users.

He said there is at least a 200% performance increase over OS/2 Warp Server Advanced 4.0 running on a single processor machine.

"This is the smoothest and fastest SMP product on the market," said Bill Allred, vice president of Compu Electronics Corp., a reseller based in Lincolnwood, Ill.

Allred tested IBM's product on two-way 200-MHz Intel-based servers against the SMP capabilities shipped with NetWare 4.1 and Windows NT Server 3.51, and it outperformed those SMP services by 5% to 10% and 20% to 30%, respectively.

Steven King, product manager for OS/2 Warp Server, said the IBM SMP add-on allows OS/2 Warp Server 4.0 to run on two- and four-way processor machines at rates up to three times faster than the SMP support delivered for previous versions of the network operating system.

IBM will ship this new SMP support as a free option for OS/2 Warp Server Advanced 4.0 customers at the end of the month. Customers can apply to receive the software at IBM's Web site ([www.soft-ware.ibm.com/os/warp-server/](http://www.soft-ware.ibm.com/os/warp-server/)). ■



Some people need a bigger serving.

Introducing the StackMaster™ Pro SPS2000. A port switching hub that slices network bandwidth according to need.



Some network users need a bigger slice of the pie, some don't. With the new SPS2000 you can assign each user to the appropriate LAN segment according to function or need – not just location. By carefully balancing your network

load you boost network productivity, for far less cost than full blown switching. Networking changes are easy as pie, too, via software that lets you avoid the hassle and cost of entering the dreaded wiring closet.

For a White Paper on port segmentation and load balancing, call Transition Networks at 1-800-267-4917 ext 0311.

612-941-7600 ext. 0311 Fax 612-941-2322

<http://www.transition.com/0311>

**TRANSITION**  
networks  
Enhancing productivity and value

## Download:

- An interview with Sun's chief technology officer on SMP
  - SMP white papers from vendors
- Type the number to the right in the DocFinder box on the home page.

NetworkWorld  
*Fusion*

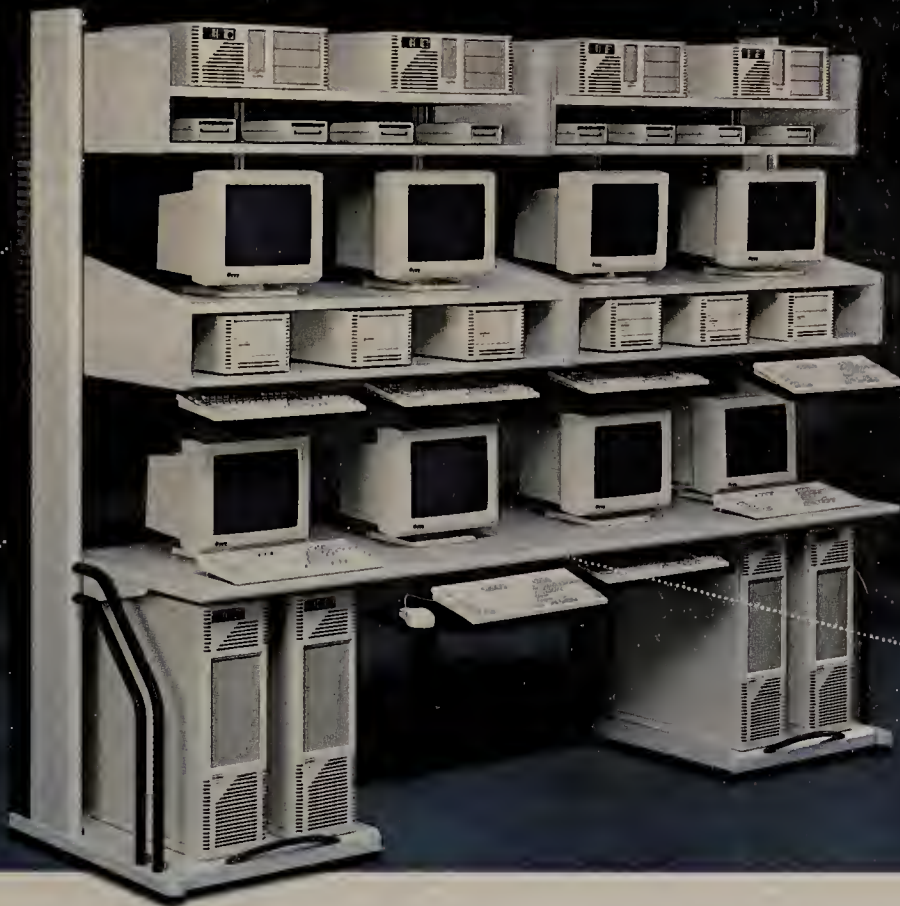
FIND IT ON  
**9602**  
FUSION



# PUT UP.

**Unique FRAME DESIGN**  
Engineered for  
unprecedented strength  
and stability, unit shown  
can safely hold 3,000 lbs.  
of equipment

**Integrated CABLE  
MANAGEMENT**  
Conceals and  
organizes wires and  
cables for easy access



**Total COMPONENT FLEXIBILITY**  
Over 500 interchangeable  
components

# OR SHUT UP.

**LAN Locker II™**  
Configuration pictured  
has been engineered  
to hold up to 2 tons  
of equipment

**Locking REAR DOORS**  
For easy access  
to hardware and cables

**36" INTERIOR DEPTH**  
Plenty of room for  
your largest equipment



**RACK MOUNT EQUIPMENT**  
Total integration  
of industry standard  
rackmountable  
hardware

**CUSTOM CONFIGURATION**  
Choose components and  
their placement to suit  
your special requirements.  
And reconfigure them  
when needs change

**PUT UP...** The open architecture of LMS II™ technical furniture optimizes vertical space, cleans up clutter and cables, looks professional and helps you work more effectively. And saving 50% to 70% space isn't hard to put up with either... just ask any of our over 30,000 satisfied customers.

**OR SHUT UP...** New LAN Locker II™ furniture architecture offers all the flexibility and configuration choices of LMS II in a completely modular, yet closed environment. Locking front and rear doors provide protection and security while offering full ventilation, equipment visibility, and easy access.

**NEW  
EDITION  
READY NOW!**

**CALL or FAX today for your free full-color  
LMS Catalog and Ordering Guide.**

I have a need in  
☐ 30 ☐ 60 ☐ 90 days.

Fax: 508 853-8904  
Tel: 800 225-7348  
<http://www.wrightline.com>

Name/Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone ( ) \_\_\_\_\_

NW

U.S. Patent  
Des. 363,701

**W R I G H T • L I N E**  
technical furniture solutions

Visit us at Networld Interop Booth 1454

**NEW!**

**TECH II™**

NEMA  
certified  
enclosures  
provide  
water and  
dust protec-  
tion. Cooling

options include up to 6,000 BTU  
air-conditioning. Locking doors keep  
hardware secure.



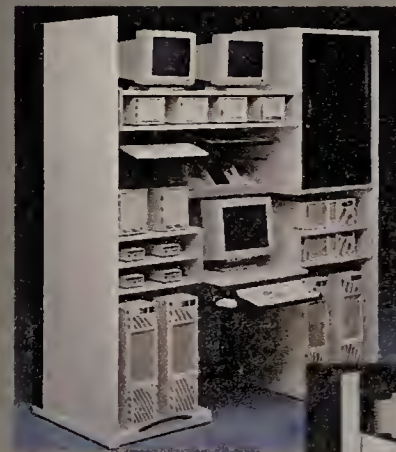
**NEW! LMS SWITCH™**

Controls up to 64 systems with one  
monitor, keyboard and mouse. You  
can assign system names – and  
locate them instantly.



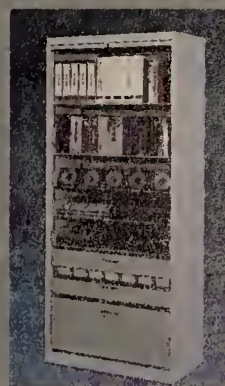
**CORNER SPACE**

Put to good use! Wide range  
of configuration choices can be  
customized to suit every need.



**LMS II IN  
MANY SIZES**

From 24" to 96"  
wide, 42" to 84"  
high. Add Caster  
Base for mobility.



**LAN CABINETS**

Locking storage for LAN tapes,  
CDs and documentation. Over 50  
interchangeable components for  
specific media.

Circle Reader Service #5





## Letting off steam over Microsoft

**W**hile Windows 95 and Windows NT Workstation are the operating systems running many desktop computers around the world, they still don't constitute a majority

of them. So for all of you running DOS, Windows 3.1, Windows for Workgroups, Macintosh OS, OS/2, Solaris, Linux and other versions of Unix, you'd expect that Microsoft Corp. would be trying its hard-

est to meet your existing needs while attempting to convince you to switch to one of its 32-bit operating systems.

In a copyrighted story that moved across the Reuters news service recently, though, a Microsoft executive vice president claimed that you are all "frankly nuts" if you expect delivery of a Unix version of Internet Explorer (IE) that will be on par with one based on Microsoft's 32-bit operating system software.

What I gathered from the article was that a half-baked Unix version of IE 3.0 might see the light of day, and it might surface before Version 4.0 for Windows 95 and NT. But I wouldn't count on seeing an IE 4 for Unix. And no mention was made of IE for Windows 3 or for Macintosh.

Now let me see if I've got this straight: Netscape Communications Corp. controls 80% of the browser market. With the release of an OS/2 version late this year, the company will support all major graphical operating systems.

Microsoft, claiming its browser is superior, isn't going to rush to port it to your operating system, though. Instead, the company will simply insult you for not switching to its operating system. Look for Don Rickles to be the company's new TV spokesman, I guess.

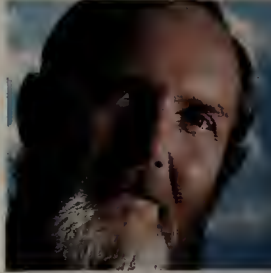
And there's more disturbing news for customers on another Microsoft front. If you're a faithful reader of this column, you've followed the on-again, off-again saga over directory services for Windows NT.

Originally announced for the next version of NT, the directory technology was later announced to ship with NT 4. When it didn't, we were told that Exchange Server's

directory was sufficient. When no one bought that line, we were told that new directory services functionality would indeed be included in Cairo, which will ship next year at the earliest.

Just hold off that network expansion you were planning, right?

Wrong. Lots of network administrators want and need enterprise directory services soon. If Microsoft is too busy trying to bump off Netscape, maybe another company can provide a service, at least until Cairo ships. But no, Microsoft refuses to open up the NT API to allow



**Dave Kearns**

# If your Web to SNA security is like the Titanic,



## get ready to go down with the ship.

### Securely Extending the Enterprise

If you're using, or want to use, the Internet or corporate intranets to access mission-critical SNA mainframe or other legacy data, you know that access better be secure. Without security, your organization could be headed for disaster. OpenConnect Systems' award winning OC://WebConnect™ software securely Web-enables host access through industry standard browser interfaces. OC://WebConnect provides multi-tier application, session, transport and host level security to assure the highest level of data protection, while delivering unparalleled value and performance.

### Beyond Security

When used with OpenVista™, the OC://WebConnect companion integrated development environment, the rapid development of customized front-end graphical user interfaces provides companies with a whole new perspective on their legacy systems.

To learn more, contact an OpenConnect representative at 800-551-5881 or 214-484-5200.



**OPENCONNECT.**  
S Y S T E M S

Securely Integrating SNA With The Inter/intraNET™



See us at Booth 5152  
**NETWORLD+INTEROP**

2711 LBJ Freeway • Dallas, Texas USA 75234 • 1-800-551-5881 • 214-484-5200 • <http://www.oc.com> • E-Mail: [info@oc.com](mailto:info@oc.com)

©1996 OpenConnect Systems, Inc. OpenConnect Systems is a registered servicemark of OpenConnect Systems, Incorporated. OpenConnect and all OpenConnect product names are trademarks of OpenConnect Systems, Incorporated. All other products or services mentioned herein are trademarks of their respective companies.

### Tip of the week

One of the most active E-mail discussion groups on the 'Net is the Novell list hosted by Syracuse University. The group's Frequently Asked Questions list has been compiled into a Windows help file for easier use. You can get a copy via File Transfer Protocol from <ftp://ftp.ultra.net.au/pub/users/novell/nvfaqhlp.zip>. If you haven't already subscribed to the list, send a message to [listserv.syr.edu](mailto:listserv.syr.edu) with a message body of "subscribe novell" (without the quotation marks).

others access to authentication services until—you guessed it—the Cairo version of NT ships.

Not to worry too much, though. Novell, Inc., Banyan Systems, Inc. and IBM will reverse-engineer NT to provide these services to network administrators who need them.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. E-mail him at [dkearns@msn.com](mailto:dkearns@msn.com).



Don't Miss The Boat...

# Fast Ethernet Just Got Faster!

## 10/100/1000 Mbps Switch



12 Port Switch  
10/100 Mbps On Each Port  
GigaBit Ethernet On Two Slots



**T**he MegaSwitch II leaves nothing to the imagination -- it gives users a unique upgrade path with 10Mbps to 100Mbps to GigaBit Ethernet all in one box. This switch offers 10/100 auto-negotiation with full-duplex on each port, as well as high powered ATM and GigaBit Ethernet uplinks. Its Smart Flow Control and singlemode fiber optic capabilities ensures zero packet loss even for remote links of 110 km. Finally, RMON management and Inter-Switch VLAN capability offers the net manager complete control over the entire network.

So, don't miss the boat. Call us at **800-858-7815** or visit our Web Site at <http://www.nbase.com>, and we'll help you move your LAN to the Fast Lane.



Leading The Way in High-Speed Switching

Headquarters 818-773-0900 • Domestic Sales 301-990-7100 • International Sales 972-4-993-6200



## configure 1

Full-Function  
Notebook

Lithium Ion  
Battery

Internal  
Diskette Drive

Choice of SVGA  
displays from  
11.3" CSTN  
to 11.8" CTFT.

Up to  
133 MHz  
Pentium®  
processor,  
hard drives  
up to 1 GB.



Detachable  
lithium ion  
battery  
also  
functions  
as a  
handle  
and a  
keyboard  
tilt.

## configure 2

Multimedia

CD-ROM

3 Lithium Ion  
Batteries

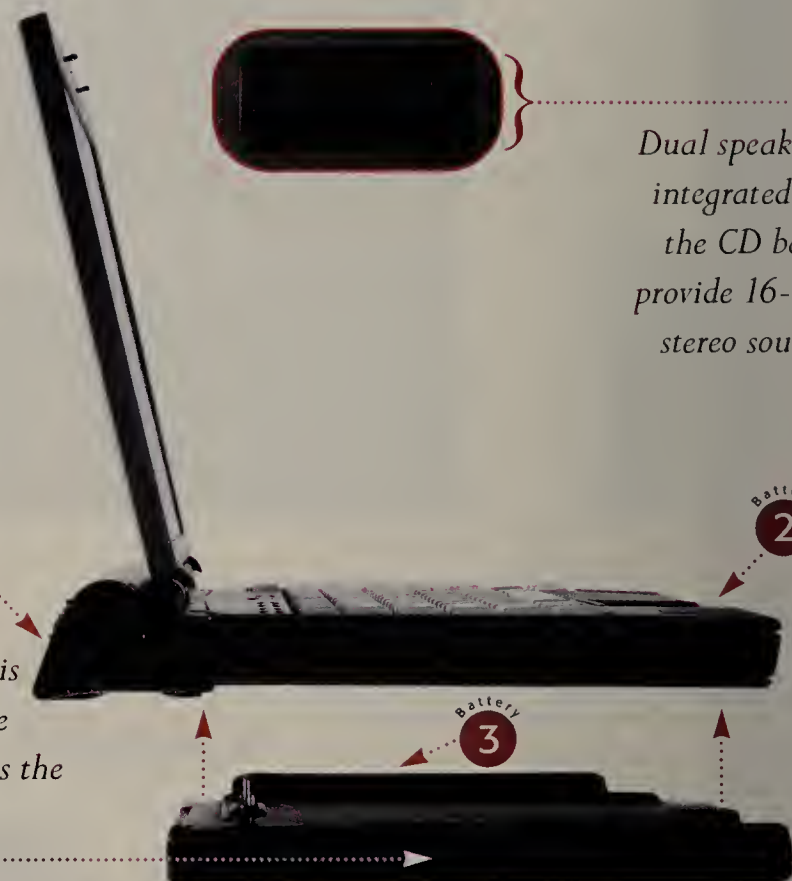
16-Bit  
Stereo Sound

Dual  
Speakers

NTSC/PAL  
TV Output

Dual speakers  
integrated in  
the CD base  
provide 16-bit  
stereo sound.

This base is  
detachable  
and houses the  
CD-ROM.



# THE COMPAQ ARMADA 4100. IF IT'

It's your call. On one hand, it's a full-function notebook. Or in a snap it's multimedia with CD-ROM. Or it's lean and mean. It also has fax machines\* and dual speakers for incredible 16-bit stereo sound. And it's Internet-ready. The new Compaq Armada 4100. It's how



©1996 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. SpeedPak and Armada are trademarks of Compaq Computer Corporation. \*Speakerphone and answering machine require Compaq SpeedPak 288 Telephony Modem, available in Summer 1996. Fax machine requires modem. The Intel Inside Logo and Pentium are registered trademarks and the Pentium Processor logo is a trademark of the Intel Corporation. Other products mentioned may be trademarks of their respective companies.



configure 3

Slimline

5.1 Lbs.

1.5" Thick

configure 4

Rest

Relaxation

Peace of Mind



*Touchpad  
can be  
replaced  
by an optional  
trackball.*

*Memory  
expandable  
up to  
48 MB.*

*Internal diskette  
drive is replaced  
by a battery.*



# NOT ONE THING, IT'S ANOTHER.

provides for three batteries with up to 10 hours of life. It's a virtual office too—complete with a full duplex speakerphone, answering and conquer the task at hand. One way or another. For more information, call 1-800-853-9521. Or visit our site at [www.compaq.com](http://www.compaq.com).

**COMPAQ**

Has It Changed Your Life Yet?



# How do you keep data, voice and video flowing?

## Widen the channel.

■ By dynamically compressing voice traffic over your

ATM network, Nortel's Magellan Passport frees up

bandwidth to handle your increasing data networking

needs. This, with the guarantee of real-time voice

transmission. ■ The award-winning

Magellan Passport

ATM enterprise

network switch

accomplishes this task

through the application

of a unique Multiple Priority

System. ■ And by widening the

channel for data, your operating costs

will decrease, while network capabilities increase.

■ Magellan Passport. One more way Nortel's custom-

designed enterprise networks are keeping information flowing.

To learn more, reach us at 1-800 4NORTEL, dept 38, or on the

Internet at <http://www.nortel.com>. ■

# NORTEL

NORTHERN TELECOM

*A World of Networks*

Enterprise Networks • Wireless Networks  
Broadband Networks • Public Carrier Networks

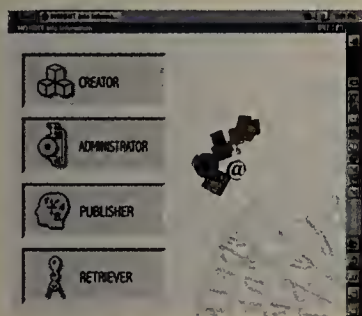


# Client/Server Applications

**Covering:** Databases • Messaging • Groupware  
Conferencing • Imaging • Multimedia • Development

## Briefs

■ **Enigma Information Retrieval Systems, Inc.** in Wellesley, Mass., this week will announce a version of its *Insight into Information text retrieval software* that includes a module for publishing information on the World-Wide Web or corporate intranets. Version 3.5 of *Insight*



into Information includes the *Net-sight* component, which automatically converts information from desktop publishing tools and word processing applications into HTML pages. Available next month, *Insight* runs on Windows NT servers and supports industry-standard Web browsers. Pricing starts at \$7,500.

Enigma: (617) 239-8279.

■ **DataBeam Corp.** in Lexington, Ky., this week will ship its *net.120 Conference Server*, software that lets users with HTML browsers participate in collaborative data conferences over the Internet or corporate intranets. Users with Web browsers may view presentations and documents, and users with T.120-compliant conferencing applications may also share applications, edit live documents and annotate on whiteboards.

The *net.120 Conference Server* runs on Window NT and Unix, and supports most Web servers. Pricing starts at \$495 for an 8-user server license.

DataBeam: (606) 245-3500.

■ **VideoServer, Inc.** has unveiled two entry-level **Multi-media Conference Servers** that cost 50% less than similar configurations previously offered by the company. Models 2007-4 and 2007-8, available immediately, start at \$22,000. The devices are available in configurations supporting up to four or up to eight conference end points.

VideoServer: (617) 229-2000.

## GroupWise 5 is here, but is it too late?

*Novell's client/server-based messaging system hits as users eye Internet-based products.*

By Barb Cole  
Orem, Utah

Novell, Inc. launched its long-awaited client/server messaging system last week, but industry watchers remain skeptical about the product's long-term prospects.

Concerns about the viability of GroupWise 5 result from the recent management upheaval at Novell and the fact that the package hits at a time when customers are looking for products that support Internet protocols.

"[Novell] essentially has a proprietary platform [in GroupWise 5], and all the momentum is moving toward the 'Net," said Rob Enderle, an analyst at Giga Information Group in Santa Clara, Calif.

The hurdles facing GroupWise are no different from those surrounding Lotus Develop-

ment Corp. Notes and Microsoft Corp. Exchange. However, Microsoft and Lotus have deeper pockets and have responded with aggressive plans to support Internet protocols.

Novell plans to do the same, but observers questioned whether it has the financial resources, marketing prowess and brand strength to ride the 'Net wave.

"The window of opportunity for GroupWise is more of a marketing one than a technical one," said Ronni Marshak, an analyst at Patricia Seybold Group, Inc. in Boston. "I don't know what [Novell] has decided to be in this generation."

In terms of features, GroupWise is a strong offering, analysts said. In addition to its Universal Inbox, GroupWise 5 offers threaded conversations and document management capabilities.

Brian Anderson, an information technology specialist at Auburn University in Auburn, Ala., and a GroupWise 5 beta tester, acknowledged, "[Novell] hasn't done a very good job of marketing GroupWise, and it's been criticized for that."

However, the company has made great strides in exploiting TCP/IP and client/server, and

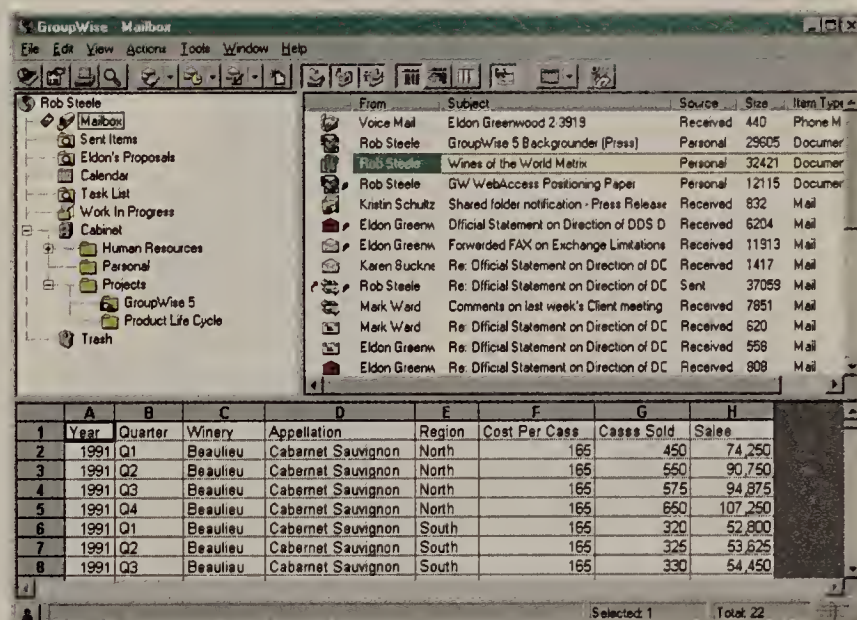
rolling out an API for customizing GroupWise, Anderson said. "They are opening up the architecture, and we're happy about that," he said.

Novell is also working to improve its Internet image. GroupWise 5.0 will support Simple Mail Transfer Protocol, Multi-purpose Internet Mail Extensions and other popular and emerging Internet mail standards.

client software, the NWAdmin administration module, remote asynchronous and X.25 gateways, Message Transfer Agent and Message Handling Service (MHS) gateways, and more.

**Our GroupWise 5 review finds that Novell has pulled off a successful revamping of its groupware offering. Page 113.**

GroupWise client versions for Windows 95, Windows NT and Windows 3.1 will be available next month, as will WebAccess



From the GroupWise 5 Universal Mailbox, users can access any GroupWise feature and navigate to any document, mail message or folder item.

Novell is sticking with its current GroupWise pricing scheme, hoping it will woo customers. GroupWise 5 starts at \$718 for a 5-user license and goes up to \$32,625 for a 250-user license. It comes with desktop and remote

for GroupWise 5. Novell will ship servers for NetWare 4 and NetWare 3 simultaneously. Macintosh and Unix clients and servers will be available in the first quarter of 1997.

©Novell: (801) 321-7300.

## Microsoft moves beyond ODBC

By John Cox  
Redmond, Wash.

Microsoft Corp.'s release of its OLE DB Software Development Kit marks the company's latest step to make its Component Object Model (COM) a foundation for corporate distributed computing.

Version 1.0 of the SDK is expected to be widely used by software vendors and at least some large MIS groups, initially to give Windows applications access to relational databases. Today, this is done by writing low-level code that uses Microsoft's more complex Open Database Connectivity (ODBC) interface.

But programmers are expected to quickly use OLE DB to do what the older interface was

not designed for: to access all kinds of nonrelational data on the network.

OLE DB is a COM specification that defines a standard way to present data from a source such as a database, log file or spreadsheet, or to see data via an application or tool. It's like an audience wearing cardboard 3-D glasses to see the 3-D effects in a movie.

Using a single, object-oriented interface, developers will be able to access log files, text documents, spreadsheets and images and, more importantly, query or update this information.

Microsoft also will promote OLE DB as an internal data shar-

See OLE, page 65

## Praxis attacks the problem of moving data across the enterprise

By John Cox  
Framingham, Mass.

Praxis International, Inc. this week will unveil software that gives network administrators a central point of control from which to define and manage the flow of information across multi-vendor databases.

Three products will be announced under the Omni-Enterprise label:

■ **OmniDirector**, a graphical tool for setting up and administering data movement.

■ **OmniCopy**, software for copy-

ing tables between databases.

■ **OmniLoader**, a program for creating large, new databases from existing data sources.

The company, based here, also will announce the External Data Source API, which is an option that lets Praxis' existing OmniReplicator software incorporate and copy data from custom or proprietary data sources.

The new products, along with OmniReplicator, are aimed not only at data warehouse applications, but also at the broader

See Praxis, page 69



# ODI desktop database opens Web doors

By John Cox  
Burlington, Mass.

Object Design, Inc. (ODI) this week will introduce a stripped-down object database designed for desktop multimedia Web applications written in Java or C++.

A major shortcoming of today's browser applications is that downloaded

components, in effect, are used once and then thrown away. ODI's new ObjectStore Persistent Storage Engine (PSE) Pro can be downloaded via the World-Wide Web to a client PC, where it stores and manages Java applets and C++ objects.

To allow this, ODI crafted PSE as a compact subset of its server object-oriented

database product, dubbed ObjectStore. A freeware version of the basic PSE product is available from ODI's Web site (<http://www.odi.com>).

The Pro version of PSE, which offers features such as transaction support and data integrity, can be downloaded for free until Oct. 15. After that, it will cost \$450.

PSE Pro for Java is written entirely in Java (there is also a version in C++), so it can be downloaded as part of an applet.

PSE Pro then acts as a data storage and management service for the applet, said Pat O'Brian, an ODI product manager. With PSE Pro running, for example, an applet that tracks and updates end-user Web document preferences can stay alive

See ODI, page 69

## RealityCheck

### Product

Object Design's ObjectStore PSE Pro

### The benefits

- ▲ Web-downloadable application components can be stored permanently on desktop
- ▲ Database supports range of data integrity and reliability features missing from Web clients

### The drawbacks

- ▼ Early beta versions forced developers to write some code, though next beta will correct this
- ▼ First release lacks support for OLE Automation

### The user view

"It's very well integrated with Java... Our developers have been impressed with the stability of the product."

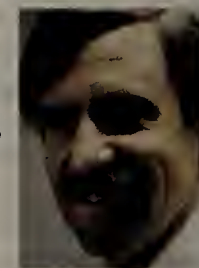
**Eric Magleby**, vice president of marketing, Alta Software Inc., Reston, Va.

## BusinessBriefs

**Dennis McEvoy** is leaving database vendor **Sybase, Inc.**, where he was president of the Enterprise Business Group, to take over as executive vice president of products and services at **Verity, Inc.**, a Mountain View, Calif., document retrieval software vendor. McEvoy was in charge of database

server development and, more recently, communications software at Sybase. He is generally credited with guiding the release of Sybase SQL Server System 11, which overcame a range of scaling and quality problems in System 10. Succeeding McEvoy is David Litwack, who previously was president of the Powersoft Business Group. Litwack will oversee all Sybase development as executive vice president for products.

**PeopleSoft, Inc.** in Pleasanton, Calif., has announced plans to acquire **Red Pepper Software Co.** in San Mateo, Calif. Red Pepper sells software called ResponseAgents, which resides on network computers and monitors a wide range of manufacturing variables. PeopleSoft embedded the Red Pepper software in its Enterprise Resource Planning product released earlier this year.



McEvoy

# NFS Maestro 5.1

## Ultimate 32-Bit Performer

### NFS Maestro Family: All On One CD!

- Windows NT\* • Windows 95
- Windows for 3.X • DOS • Microsoft TCP/IP

- High performance kernel-mode NFS client
- **NEW** Telnet with full graphical keyboard remapping, VT320/220, Wyse 50/60, ANSI BBS, SCO ANSI emulations, DDE server/OLE automation
- **NEW** Columbus - Web Browser, E-mail, Netbook, News, FTP, Gopher and more • Extensive suite of support utilities such as Ping, Finger, Traceroute, LPD and others
- Basic, Launch Pad, TN3270, **NEW** TN5250
- **NEW** Sconfig - easy, customizable installation
- SOCKS V4 Support • **NEW** TAR • **NEW** IRC Client
- **NEW** Archie • Inetd • NFS Maestro for Windows and DOS includes a 32-bit VxD TCP/IP stack
- Also available: NFS Maestro NT Server

\*ALPHA and Power PC versions available

NFS Maestro provides file sharing solutions and powerful Internet access tools for Windows NT, Windows 95, Windows 3.X and DOS operating systems. To protect your long-term technology investments, Hummingbird delivers NFS Maestro for all Microsoft platforms on a single CD. For more information or the name of the reseller nearest you, call (416) 496-2200. Or, visit our Web site at [www.hummingbird.com/nw.html](http://www.hummingbird.com/nw.html)



**HUMMINGBIRD**  
COMMUNICATIONS LTD.

1 Sparks Avenue, North York, Ontario, Canada M2H 2W1 Tel.: (416) 496-2200 Fax: (416) 496-2207 • Offices in: Washington DC, Mountain View CA & Raleigh NC, USA • Geneva, Switzerland • Paris, France • Munich, Germany • Maidenhead, UK  
All brand or product names are trademarks or registered trademarks of their respective companies. ©1996, Hummingbird Communications Ltd. Applications included may vary depending on the PC platform.



# ATM STANDARDS READY, SET, GO!

## FORE

### ATM Forum Standards Matrix

Feature	DEFINED	FORE Compliant
<b>LAN Emulation 1.0</b>		
LAN Emulation Server (LES), LAN Emulation Client (LEC)	✓	YES
LAN Emulation Configuration Server (LECS), Broadcast Unknown Server (BUS)	✓	YES
<b>Classical IP</b>		
Address Registration	✓	YES
Address Resolution	✓	YES
<b>UNI 3.X Signaling, IISIP Routing</b>		
Switched Virtual Circuits (SVCs)	✓	YES
Point-to-point	✓	YES
Point-to-multipoint	✓	YES
OSI NSAP Address	✓	YES
DCC ATM Format	✓	YES
ICD ATM Format	✓	YES
E.164 ATM Format	✓	YES
Signaling AAL (including SSCF, SSCOP)	✓	YES
Public UNI	✓	YES
<b>PNNI</b>		
<b>Physical Layer Interfaces</b>		
OC-3c/STM-1 SONET/SDH @ 155.52 Mbps, Fiber	✓	YES
STS-3c/STM-1 SONET/SDH @ 155.52 Mbps, UTP-5	✓	YES
DS3 @ 44.736 Mbps	✓	YES
TAXI (4B/5B) @ 100 Mbps	✓	YES
E3 @ 34.368 Mbps	✓	YES
DS1 (T1) @ 1.544 Mbps	✓	YES
E1 @ 2.048 Mbps	✓	YES
J2 @ 6.312 Mbps	✓	YES
OC-12c/STM-4c SONET/SDH @ 622.08 Mbps, Fiber	✓	YES
TP25 @ 25.6 Mbps	✓	YES
<b>ATM Layer Specifications</b>		
ATM Layer Functions Involved at the UNI (U-plane)	✓	YES
Setting of Cell Loss Priority (CLP) bit (Tagging)	✓	YES
UPC Policing (including Dual Leaky Buckets)	✓	YES
Selective Cell Discard (CLP=1 Discard)	✓	YES
EFCI Flow Control Support	✓	YES
<b>ILMI Specification</b>		
MIB Support	✓	YES
Address Registration	✓	YES

As a network manager, you need to know two things about ATM standards.

First, ATM standards are continuously evolving to keep pace with the development of new ATM network feature enhancements. Evolving standards are a fact of life for any healthy technology, whether it's ATM or others that have gone before it, such as IP.

Second, and more importantly, ATM industry standards are ready—right now—for you to build an ATM workgroup or backbone, and connect your existing network. Today. Without replacing your current network infrastructure.

#### SEE FOR YOURSELF

The Anchorage Accord developed by the ATM Forum, provides specifications for everything you need to build an ATM internetwork compatible with your installed networking equipment.

These standards are firm, and so is FORE's compliance with them—as detailed in this checklist for our *ForeThought™* 4.0 Internetworking Software. What's more, FORE goes the extra step by offering the value-added features that allow you to build an even more robust ATM internetwork—today. Without a forklift upgrade.

Join thousands of other organizations who are increasing productivity, reducing network costs and gaining a competitive advantage through FORE ATM.

To obtain a copy of the standards checklist, future standards updates and a free copy of, "A Guide to ATM Data Networking", contact us at 1-888-404-0444.

A Principal Member of



The ATM Forum

Circle Reader Service #81

**FORE**  
SYSTEMS

174 Thorn Hill Rd., Warrendale, PA 15086-7535 Phone: 1-888-404-0444 Fax: 412-635-3625 Internet: info@fore.com or http://www.fore.com



## Standards progress

## Vendors rally around 'Net calendaring spec

More than 35 vendors to support Versit's vCalendar, which defines how calendaring apps can work together.

By Barb Cole  
Atlanta

An industry group this week will publish an interoperability specification for plan-

ning meetings over the Internet that could be key to the development of a full-blown Internet Engineering Task Force (IETF) group calendaring spec.

The Versit industry group, driven by IBM, Siemens AG and Lucent Technologies, will unveil Version 1.0 of its vCalendar specification, which defines how users

of disparate calendaring applications can make appointments over the 'Net, intranets and LANs.

The development of a calendaring and scheduling specification for the 'Net has become a popular subject as of late. Netscape Communications Corp. this summer hosted dozens of software developers at its Internet Calendaring Summit and announced plans to spearhead creation of such a protocol.

Separately, Lotus Development Corp. talked up its plans to push its own Internet Calendaring Access Protocol (ICAP) as a way for users to make appointments via the Internet.

Analysts and representatives from the industry groups, however, said that this is not a case of dueling standards. In fact, the Lotus effort is based on vCalendar, and all of these calendaring specifications are likely to be submitted to the IETF and incorporated into an overall calendaring standard, analysts said.

## FACTS ABOUT THE VERSIT CONSORTIUM

- ▶ Founded by Apple, AT&T, IBM and Siemens
- ▶ Developing specs for interoperability among communications and computing devices, applications, networks and services
- ▶ Creating specs based on existing standards and making the specs publicly available
- ▶ Not involved in building commercial products

"Versit is yet another potential structure and format that could be filed with the IETF," said Ron Rassner, an analyst at Creative Networks, Inc., a consultancy and market research firm in Palo Alto, Calif. "I'd like to think that there won't be a lot of rework [within the IETF] because [vCalendar] provides a solid format on which to build the ongoing standard," he said.

The work under way by Lotus, Netscape and others addresses some of the broader, collaborative issues of running scheduling applications over the 'Net, Rassner said.

Indeed, vCalendar provides a basic format for capturing and exchanging events and action items, and defines how attachments may be passed between calendaring applications. Lotus' ICAP and the Netscape-led work are expected to solve the problem of how the software should respond when a scheduling conflict arises between applications.

More than 35 vendors — including CE Software Corp., Goldmine Software Corp., Lotus and Novell, Inc. — last week said they will support vCalendar in their meeting software.

The Netscape-led group has yet to produce a published spec, but it has garnered support from a herd of software developers.

The vCalendar spec may be downloaded from Versit's home page ([www.versit.com/pdi](http://www.versit.com/pdi)).

©Versit: (919) 254-5861.

## Things Have Grown Beyond Our

## Wildest Imagination!

A few short years ago we set out to be the premier supplier of Frame Relay Access Devices. As a result, we have become one of the top two manufacturers worldwide.

Why is FastComm equipment sprouting up in networks all over the world? Our FRADs and routers are easy to install, voice over frame relay is no problem, and now, thanks to our WEB.router, internet access is a walk in the park. Call us and you no longer have to deal with large, arrogant router companies!

The big guys have seen us blossom on their turf. We plan to keep growing there. Come grow with us.

See Us At Networld+Interop...Booth #6862  
and Interop DotCom...Booth #508h  
Sept. 18-20 in Atlanta!



**FastComm™**

FastComm Communications  
Corporate Headquarters:  
Phone: 703-318-7750  
FAX: 703-787-4625  
[info@fastcomm.com](mailto:info@fastcomm.com)  
<http://www.fastcomm.com>  
Australia/Asia  
Phone: 61 2 9963 3383  
FAX: 61 2 9418 8277

Integral CSU/DSU • Telnet • SNMP • SDLC • Spoofing • Mapping • Routing • SNA/SDLC • TCP/IP  
SLIP/PPP • X.25 • IPX • ARP • Burroughs Poll/Select • RIP • SAP • BootP • Annex G

FastComm Logo and WEB.router are registered trademarks of FastComm Communication Corporation © 1996 FastComm Communication Corporation.

Circle Reader Service #53



# Connect Here.



NW 9/16

☐ Send me more information on GDC's breakthrough communications solutions.

I am interested in: (check all that apply)

- |   |  |
|---|--|
| <input type="checkbox"/> ADVANCED NETWORK<br>ACCESS PRODUCTS (ANAP) | <input type="checkbox"/> SERVICE SUPPORT (SS)                              |
| <input type="checkbox"/> ATM PRODUCTS (ATM)                         | <input type="checkbox"/> TECHNICAL TRAINING (TT)                           |
| <input type="checkbox"/> INTERNETWORKING PRODUCTS (IP)              | <input type="checkbox"/> PLEASE HAVE GDC REPRESENTATIVE<br>CONTACT ME (SC) |

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State/Country \_\_\_\_\_ Zip \_\_\_\_\_

Phone (    ) \_\_\_\_\_ Fax (    ) \_\_\_\_\_

1. Industry: (check one only)

- ☐ 01. Manufacturing
- ☐ 02. Finance/Banking
- ☐ 03. Insurance
- ☐ 04. Real Estate
- ☐ 05. Healthcare Services

☐ 06. Legal

☐ 07. Retail/Wholesale Trade

☐ 08. Transportation

☐ 09. Utilities

☐ 10. Education

☐ 11. Government State/Local

☐ 12. Government Federal

☐ 13. Military/Aerospace

☐ 14. Consultants

☐ 15. Carriers/Interconnects

☐ 16. Distributor/Reseller

☐ 17. Other \_\_\_\_\_

2. Job Function:

- ☐ 01. Corporate/Financial Mgmt.  
(CEO, CFO, President)
- ☐ 02. MIS/DP Mgmt. (Dir, V.P.)
- ☐ 03. MIS/DP Staff

☐ 04. Communications/Networking Mgmt. (Director, V.P.)

☐ 05. Communications/Networking Staff

☐ 06. Engineering/Operations Mgmt.

☐ 07. Consultants/Analysts

☐ 08. Other \_\_\_\_\_

3. Purchase Involvement:

☐ Recommend (R)

☐ Specify (S)

☐ Approve (A)

If you would like more information about General DataComm, please call 1-800-SWITCH-ON or (203) 574-1118, extension 6477.





NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES



---

---

# BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO 545 MIDDLEBURY CT

---

---

POSTAGE WILL BE PAID BY THE ADDRESSEE

ATTN DEPARTMENT 211  
GENERAL DATACOMM INC  
1579 STRAITS TURNPIKE  
PO BOX 1299  
MIDDLEBURY CT 06762-9980





There's one continent where our  
ATM edge switches are not in use...

...yet.

Wherever you travel in the world, there's a very good chance that General DataComm will have already been there.

Europe, the Americas, Africa, Asia, Australasia...

...there are now hundreds of sites around the world that are home to an ATM switch from General DataComm.

The fact is that when organizations worldwide look to their Service Providers for the high speed voice, video and data transfer they need,



those Service Providers are, in turn, looking to General DataComm for the solution.

That solution is General DataComm's APEX family of ATM switches.

The number one choice of carriers to provision ATM services and Virtual Private Networks, APEX switches offer an incomparable range of features including:


- Support of native ATM interfaces with SVC's
- Adaptation of non ATM traffic including Frame Relay and voice
- Integral video and LAN capabilities
- Automatic re-routing to prevent service interruption

So when the time comes for you to deliver the exciting new multimedia applications opened up by ATM, ask General DataComm to show you the way.

Start now by calling our information line to order your free copy of our 'APEX in Action' brochure.

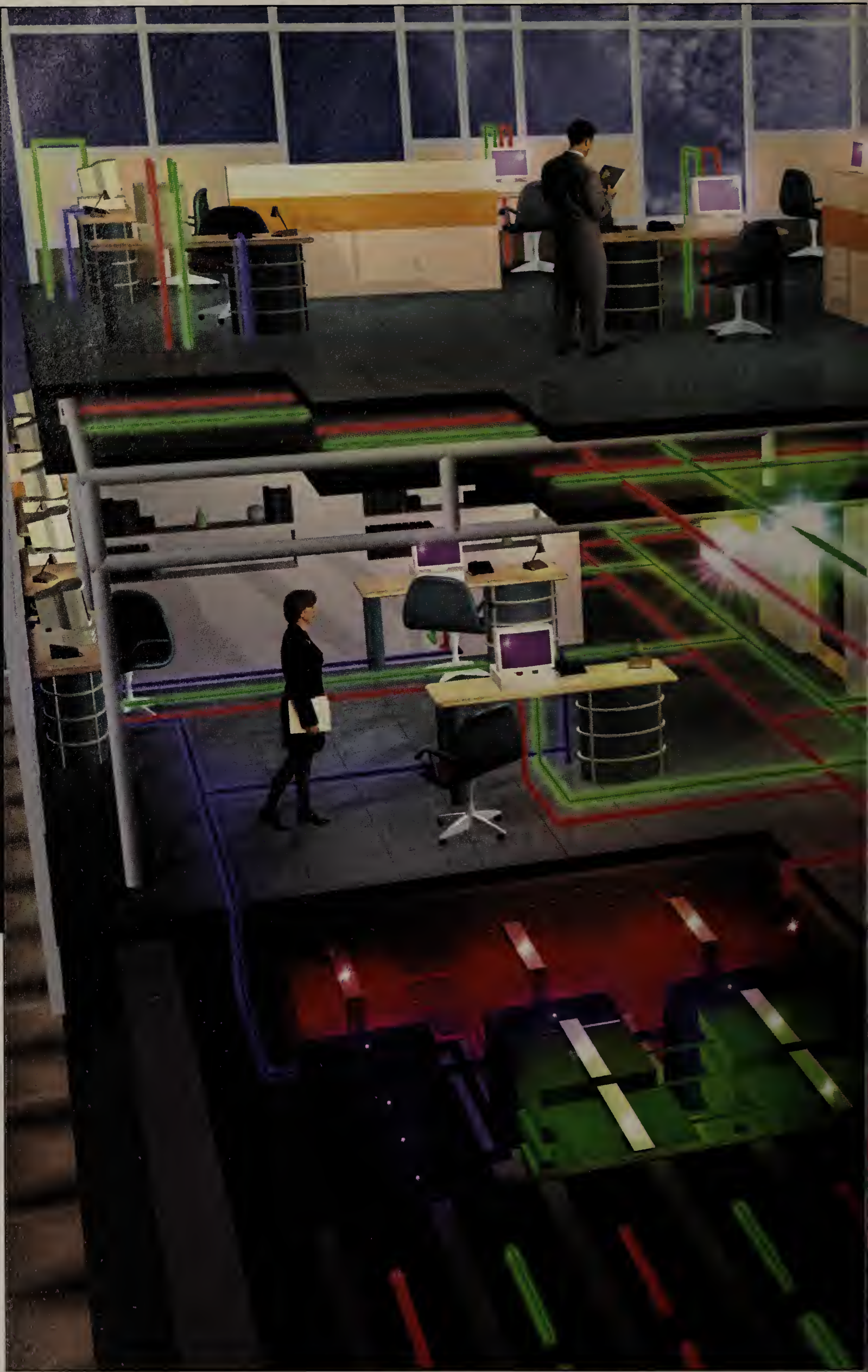


Call 1-800-SWITCH-ON  
<http://www.gdc.com>

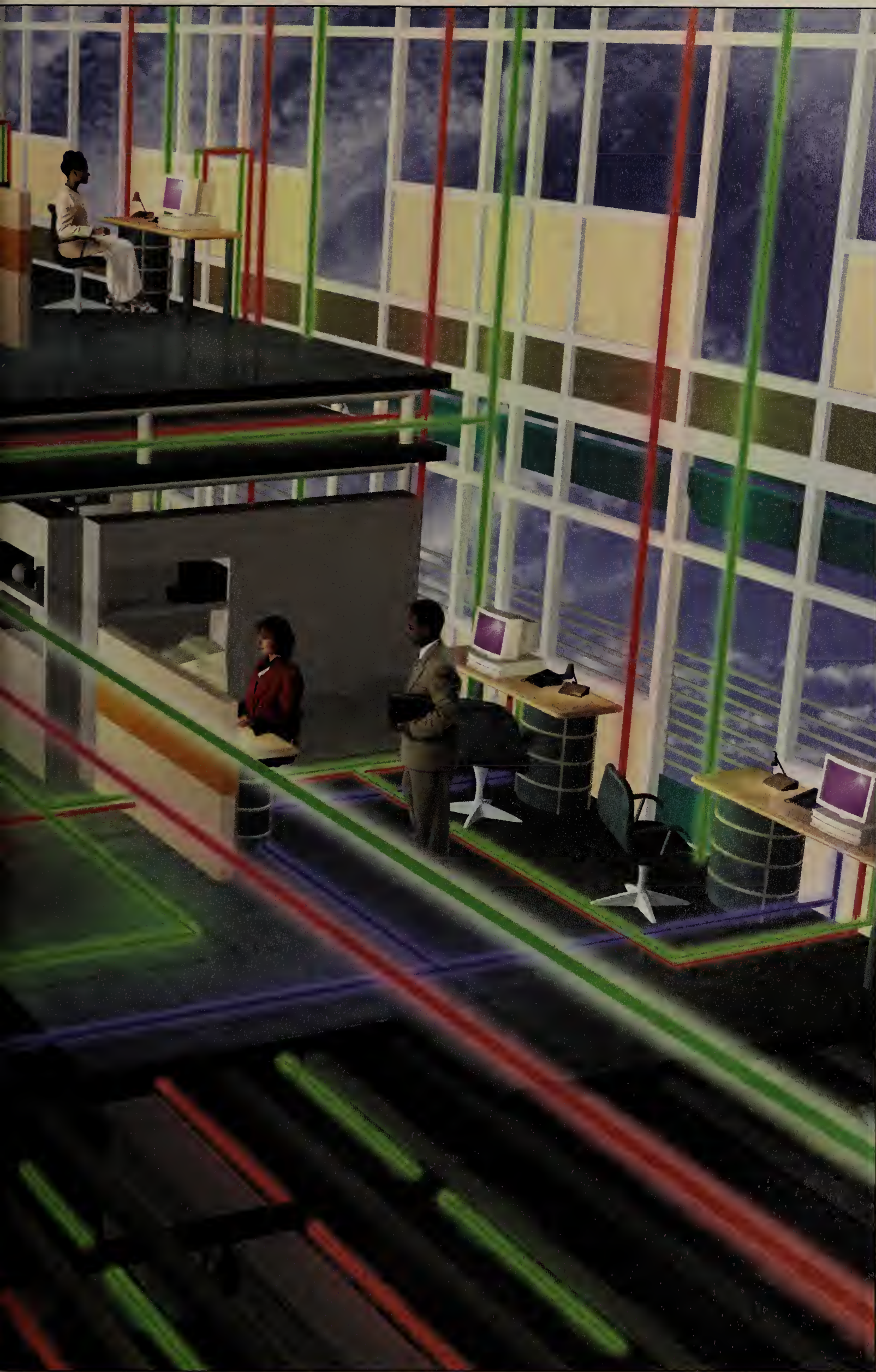
 **General DataComm**



Before  
you  
decide  
how  
to cable  
your  
network,  
let's talk  
about  
the  
cost of  
managing  
it.







Your LAN is costing you money.

AMP has a cabling plan that can

dramatically cut the cost and

complexity of managing it. We call it

Centralized Network Administration

(CNA) and we make it happen by

consolidating all your building's LAN

electronics in a single closet.

It's easier to manage, easier to

grow, and easier to migrate to

new technologies. Find out more.

Call 1-800-835-7240.

Connecting  
at a  
**HIGHER**  
level.

Find out more. Call 1-800-835-7240 <http://www.amp.com/networking>  
Outside the U.S., please contact your local AMP sales office.

Circle Reader Service #44

AMP and Connecting at a Higher Level are trademarks.

Networking





# Document management on a budget

*Exploiting the hooks between Docs Open and Microsoft Office applications helped one travel agency implement a cost-effective system.*

By Barb Cole

Peterborough, U.K.

The Thomas Cook company has found a better way for the refund applications streaming into its customer service center

to travel: through a document management system that is tightly linked to its E-mail and desktop applications.

The automated document management system has greatly improved the

travel company's efficiency in processing claims from customers whose traveler's checks have been lost or stolen. In addition, the system has enabled Thomas Cook to launch a successful service in which it handles claims processing for other companies.

Previously, Thomas Cook processed claims using a largely manual and paper-intensive process. Some case tracking information was stored on a mainframe

accessed with dumb terminals.

The key to the new client/server document management system, based on PC DOCS, Inc. Docs Open software, is that it has strong hooks to messaging, word processing and other applications in Microsoft Corp.'s Office suite. This has enabled Thomas Cook to avoid the expense of applications customization that is often involved in deploying a document management system.

Thomas Cook's Refund Management System processes refunds on lost or stolen traveler's checks issued all over the world. Claim forms from customers are typically faxed into the customer service center.

## Nothing gets out of Milkyway Networks' BLACK HOLE™

### ...INTERNET AND INTRANET SECURITY FIREWALL



## The best private network protection in the universe...

There is a way to protect your data from cyber crime.

The Black Hole™ from Milkyway Networks Corporation is the industry's most robust, feature-rich firewall. User friendly and easy to install, the Black Hole end-to-end network security solution makes your private network completely safe from all intruders. Invisible within the Internet and Intranet, Black Hole allows you to enjoy all the benefits of doing business electronically, confident that no one can probe or retrieve valuable information from your network.

#### MAXIMUM INTERNET AND INTRANET SECURITY

- FIRST FIREWALL SUCCESSFULLY EVALUATED BY GOVERNMENT ORGANIZATION
- DATA ENCRYPTION SUPPORTS VIRTUAL PRIVATE NETWORKS (VPN)
- COMPLETE TRANSPARENCY FOR SINGLE-STEP CONNECTIVITY
- BLANKETED NETWORK MONITORING INSTANTLY DETECTS HACKERS
- OFFERS SERVICE NETWORK CONFIGURATION
- FULL GRAPHICAL USER INTERFACE (GUI)
- ONE-TIME PASSWORD SCHEMES INCREASE USER SECURITY
- FULL USER LEVEL AUTHENTICATION FOR MAXIMUM SECURITY
- FLEXIBLE CONFIGURATION SUPPORTS CURRENT AND FUTURE APPLICATIONS

**MILKYWAY**  
NETWORKS  
Next generation Internet security applications

Milkyway Networks Corporation  
4655 Old Ironsides Drive, Suite 490  
Santa Clara, CA 95054

Phone: 1-800-206-0922  
<http://www.milkyway.com>  
[info@milkyway.com](mailto:info@milkyway.com)

#### The bottom line

Thomas Cook made a significant initial investment in its document management system, but the system should eliminate expenditures the company would otherwise have had to make in building its outsourcing service for travel check refunds.

Document management system component	Initial cost	Projected year 1 cost
Servers	\$30,000	\$0
Fax server	\$7,500	\$0
Gateways	\$9,000	\$0
Printers	\$18,000	\$0
Systems integration	\$300,000	\$0
Software	\$75,000	\$0
Support	\$45,000	\$45,000
Total per period	\$484,500	\$45,000

Area of savings	Initial savings	Projected year 1 savings
Hiring	\$1,320,000	\$1,320,000
Temporary help	\$20,000	\$20,000
Office space	\$300,000	\$300,000
Total savings	\$1,640,000	\$1,640,000

Fax software automatically shoots incoming refund claim forms to Docs Open in-boxes on workers' PCs. The claim form is displayed on the PC — typically a Windows 95-based 486 machine with 12M to 16M bytes of RAM and 200M to 500M bytes of disk space.

Fax images of claim forms are stored on a Compaq Computer Corp. server, and an IBM RISC 6000 server running Sybase, Inc. SQL Server holds accompanying data.

About 100 users of the Refund Management System have icons on their Windows desktops for Docs Open and the Microsoft Office applications, as well as an icon to access the mainframe application that preceded the client/server system. This December, the company will add another 100 Refund Management System stations on its 16M bit/sec token-ring network.

The links between the Refund Management System and Microsoft Office have helped to make the project a success, according to Paul Borrell, business project manager for Thomas Cook's customer service team.

As part of the refund procedure, the claims officer selects a form letter — one of hundreds the division has stored in Microsoft Word — which is automatically faxed back to the claimant or travel office. In addition, links between Microsoft Mail and the mainframe application let users

*See Docs Open, page 65*

Visit Milkyway Networks at Network + Interop, Booth 2604 Hall ABC

Circle Reader Service #93





1003

"I started running OS/2 Warp Server on all my networks and guess what?

# My rainy days are over."

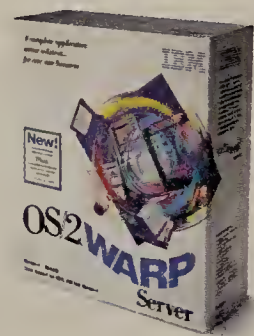
## Consolidate

It was time to think about consolidating the company's mixed environment network onto one operating system. That's why Steve Conaway, Director of Computer Services at the Financial Times, decided to check out the new release of OS/2® Warp Server.

In no time at all, Steve was waxing poetic over OS/2 Warp Server's ability to handle blockbuster-sized databases and make Internet and intranet access a breeze. He was also impressed with all the advanced printing capabilities and management features that simplified the running of both his

network and his life. Which is why Steve now thinks of OS/2 Warp Server as his umbrella network operating system.

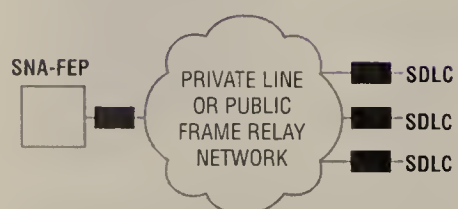
Find out what got Steve so excited. Call 1 800 IBM-2468, ext. EA 130, or visit us at [www.software.ibm.com/info/ea130](http://www.software.ibm.com/info/ea130) for details. With special offers of additional software (valued at up to \$1,400) available when you buy OS/2 Warp Server and Lotus Notes® before September 30, 1996, there's really no better way to demonstrate fiscal responsibility.



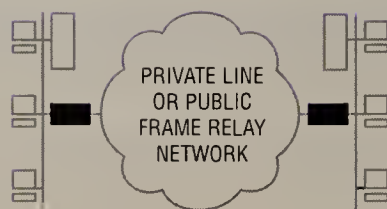
Solutions for a small planet™



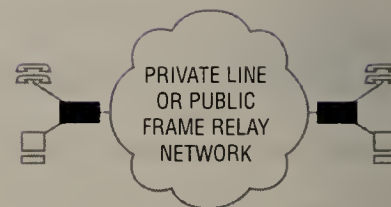
*Shall I Router?...*  
*Shall I FRAD?...*  
*Shall I Voice Mux?...*



**SNA MIGRATION**



**LAN-TO-LAN CONNECTIVITY**



**VOICE/DATA INTEGRATION**



You can do anything you want to do--anytime you want to do it. That's the beauty of the Thunderbolt™ CX 900 remote branch WAN access device. It's a Router that connects your LANs. It's a FRAD for SNA migration. And it's a Frame Relay switch for complete Voice/Data integration. All in a single scalable, low cost package. And when combined with the Thunderbolt CX 1000 central site device, you have a total Frame Relay solution of unsurpassed power, adaptability and ease of use.

# Shall I Shine?



*Doing it all with the CX 900:  
A philosophy of effective WAN integration  
and shameless career enhancement.*

With the Thunderbolt family, you can start anywhere...say, with a CX 900 and SNA. If you want to add a function, you simply add a card--a voice card, a LAN card, a V.34 back-up card, a Token Ring card... Its six slot, modular architecture lets you take your network anywhere at any time. It's that simple. It's that smart.

Maximum system flexibility at both remote and central sites. ISDN for dial back and main access. Speeds from 56k to T1/E1. The Thunderbolt CX 900 and CX 1000- the most adaptable and cost-effective internetworking solution available. An easy choice. And you shine.



**MEMOTEC**

ADAPTIVE SOLUTIONS FOR EVOLVING NETWORKS

**See us at Networld+Interop, Booth No. 2544**

**800-570-MEMO • <http://www.memotec.com>**



**NFS client & server  
together at last,  
working harmoniously  
with Windows, Mac & Unix.  
So simple, so economical.**

---

**Sort of chokes you up just thinking about it.**

**tcpCONNECT4™  
Check it out.**

**[www.intercon.com/215/](http://www.intercon.com/215/)**

Okay, you're not that emotional about NFS. But be happy InterCon is. Because it led us to create tcpCONNECT4™ NFS, the most comprehensive NFS solution ever. Only CONNECT4 NFS includes both client and server for Windows 3.x, 95, and NT. And a Mac client version. Equally important, CONNECT4 NFS is the fastest NFS client on the market. And thanks to

our exclusive fluid licensing™ you can mix and match platforms and editions using only a simple key. Configuration, distribution, training, and support take far less of your time and energy. Now that's enough to make the most cynical network manager get a little misty. Visit our Web site or call 1.800.468.7266, dept. 215 for a free evaluation copy. And bring a hanky.

©1996 InterCon Systems Corporation. All rights reserved. tcpCONNECT4 and fluid licensing are trademarks of InterCon Systems Corporation. All other trademarks are property of their respective owners.



## OLE

*Continued from page 53*

ing mechanism that can be used to recast existing software applications as a group of separate components glued together with OLE DB, according to Greg Nelson, Microsoft senior product manager for data access.

"You can build [OLE DB] very deeply into your application development tool, for example, so that every data access done by the tool is done via OLE DB," he said.

But that is probably a long way off. Initially, OLE DB is expected to be used mainly as a simpler way to access ODBC data.

### OLE DB Software Development Kit 1.0

- ▶ Based on Microsoft's Component Object Model (COM); will support Distributed COM by year-end
- ▶ Includes tools for building object-oriented data access interfaces to nonrelational data on the network
- ▶ Features special "bridge" software that lets OLE DB applications and development tools work with existing and future Open Database Connectivity software to access relational databases
- ▶ Will support connectionless sessions over the Internet by year-end

"Microsoft has built [management of data access into OLE DB], so this is handled invisibly to the client application," said Michael McLean, general manager for developer products at Simba Technologies, Inc., an ODBC software vendor.

"There are fewer calls for the programmer to worry about," he said.

## Docs Open

*Continued from page 60*

send information still stored on the main-frame via E-mail. Users may also exploit Schedule+ to trigger workflows to resolve a claim.

The document management system has helped Thomas Cook double its volume of business while adding only about 33% more staff, according to Borrell.

### Lessons learned

While the application has been well received, there were some hurdles along the way, according to Borrell.

He found that the stored images from resolved claims and pending claims were quickly filling up the Compaq server's hard disk.

"We went through a period where we were buying up extra hard disks like crazy," he said. "We then decided to move unused images off to optical disks," he said.

In addition, the drastic shift from dumb terminals and paper to Windows PCs in just a few months put a big burden on the workers.

"We implemented too much change at once; we should have phased it in more," Borrell said. ■

The Microsoft SDK includes two software modules to support OLE DB and ODBC interoperability. One module lets OLE DB applications work with ODBC. The other lets ODBC applications work with OLE DB data sources, which Microsoft calls providers.

ODBC vendors such as Simba and Intersolv, Inc. have already announced their existing products have been made compatible with OLE DB.

"We're able to protect our customers' investments in ODBC," said McLean. Simba next plans to create a native OLE DB driver to communicate with OLE DB data sources, and finally, a complete SDK of its own.

"This approach lets our customers adopt [gradually] object-oriented methodologies into their application development process," he said.

One critical piece missing from the

SDK is support for Distributed COM (DCOM), which Nelson said will be available by year-end.

DCOM lets COM objects communicate over the network. Until DCOM is available with the SDK, OLE DB will be limited to the desktop or to interfacing with ODBC software.

The OLE DB SDK is free and available now at Microsoft's World-Wide Web site (<http://www.microsoft.com/oledb/>). ■

<http://www.compuware.com>  
Compuware, EcoSYSTEMS and EcoNET are registered trademarks of Compuware Corporation. ©1996

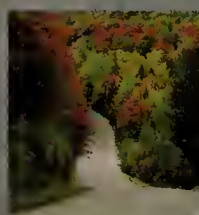
**Is network traffic slowing your applications performance?**

**With EcoNET from Compuware you'll know. You'll also improve quality of service, measure service goals, and, gain greater control of network costs.**

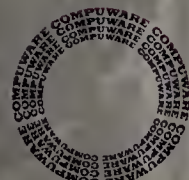
**Here's why you'll call EcoNET your network traffic report.**

- **Automatically discover over 1200 applications.**
- **Measure apps response time.**
- **Monitor applications traffic-flow through routers and switches.**

**Call Compuware. 1 800 368 4ECO. Learn more about EcoNET and the complete EcoSYSTEMS approach to Networked Applications Management. Also ask about our 2900 strong professional services staff.**



**Compuware. Enjoy the open road.**

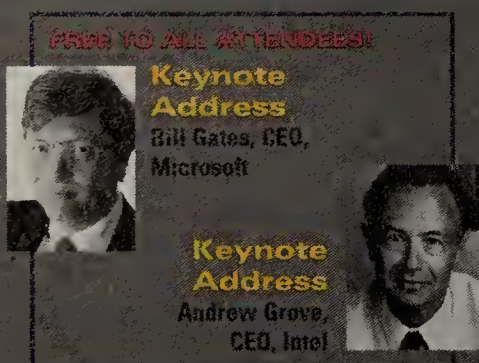


**REAL  
WORLD  
SOLUTIONS**

**COMPUWARE®**



# Not all the hottest products at COMDEX/Fall will be on the exhibit floor.



## TECHNOLOGY CONFERENCE TRACKS

- Management and Decision Making
- Platform Predictions
- Interactive Content Development
- Hot Technologies
- Internet and Intranets
- Information Management
- Data Management and Storage Connections
- Development Tools and Techniques
- Technology Fundamentals

## SUPERSESSIONS

- Research Under Wraps
- Technology Crossfire — Virtual Questions, Real Answers
- Today's Movers and Shakers
- The Next 25 Years

## POWERPANELS

- Beyond the Internet Hype: Real Web Applications
- The Crystal Ball
- Java: The Next Billion-Dollar Business

## COMDEX INFOCUS

- Industry Insights: Follow the Leaders
- Industry Hot Spots
- Technology Road Maps
- Entrepreneur's Forum

## INTERNATIONAL MARKETING FORUM

- Europe
- Latin America
- South America
- Asia

## SPONSORS INCLUDE



## Experience the COMDEX Conference.

**IDEAS@  
WORK**

There's only one thing as powerful as the products on the COMDEX/Fall exhibit floor — the powerful ideas in the COMDEX/Fall Conference. That's why you shouldn't do one without the other. Because new products require new business-building strategies, implementation plans, and technical insights.

With over 70 sessions on everything from the desktop to the server to the Web, the COMDEX Conference completes your show experience with information that's more immediate, valuable, and useful than you'll find from any other single source. So when you go to Las Vegas this November, be sure to make the most of IT — at the COMDEX/Fall Conference.

**3 ways to REGISTER** and get more information.

1. Call the CONFERENCE HOTLINE at (617) 433-1650 to register for the conference or to find out more about sessions and speakers.
2. To register by fax call (617) 449-5554, enter code 30, and have your fax number ready — we'll fax your registration form within 24 hours.
3. Visit the hottest site on the Web to register and for complete info!

**[www.comdex.com](http://www.comdex.com)**

©1996 SOFTBANK COMDEX Inc. • 300 First Avenue, Needham, MA 02194-2722 USA

C03027 8/96

**COMDEX®**  
Fall '96

NOVEMBER 18 — 22, 1996 • LAS VEGAS, NEVADA USA



Did you get my document?

Yeah, I made a few changes.

## INTRODUCING NETWORKS WITHOUT LIMITS. MADE POSSIBLE BY WINDOWS NT WORKSTATION AND KINGSTON MEMORY.



Unleashes  
the power of  
Windows NT® 4.0

If you want to take your network and business to a higher level, you need Microsoft® Windows NT® Workstation. Of course, an operating system that powerful should be fueled only by the finest memory: Kingston®. You'll see productivity go through the roof. People will be downloading vital information from the Internet, running multiple 32-bit applications at light speed, and sending messages and



images back and forth across the planet. So, why Kingston memory? Kingston engineers use the exact same specifications as system manufacturers, like DEC,™ Compaq®, HP®, and IBM®. And they test every cell on every chip on every module. (On a 16 megabyte module, that's 128 million cells.) Besides, Kingston memory costs far less than the system manufacturers'. To find out more, call (800) 567-0384 today. And watch your network really take off.

**Kingston**  
TECHNOLOGY CORPORATION

For more information call us at (800) 567-0384



Visit our Web site: <http://www.kingston.com/nw.htm>

Kingston Technology Corporation, 17600 Newhope Street, Fountain Valley, CA 92708 USA, (714) 435-2600, Fax (714) 435-2699. © 1996 Kingston Technology Corporation. All rights reserved. Kingston memory is compatible with Windows NT Workstation. Kingston is a registered trademark and Computing Without Limits is a trademark of Kingston Technology Corporation. Microsoft and Windows NT are registered trademarks of Microsoft Corporation. All other trademarks are the property of their respective owners.



# With Our Networking Products There Are No Boundaries



**Toll-Quality Voice**

**Multi-Protocol Data**

**Satellite WANs**

*First in Voice Over Frame Relay*

**ACT NETWORKS**

**Visit Us At Networld + Interop Booth 5316  
Atlanta, GA September 18-20**

**Visit Us At Satellite Communications Expo and  
Conference Booth 411, Washington, DC Sept. 24-26**

Website <http://www.acti.com>

Email [info@acti.com](mailto:info@acti.com)

**Corporate Headquarters, Camarillo, CA +1 800 367-2281 Toll Free, +1 805 388-2474 INTL, +1 805 388-3504 FAX**

ACT Presticom, Inc.  
Montreal, Quebec (Canada)  
+1 514 443-2909  
+1 514 443-2878 FAX

ACT Networks, Inc.  
Naperville, IL (USA)  
+1 630 778-3443  
+1 630 637-8587 FAX

ACT Networks, Inc.  
Bethesda, MD (USA)  
+1 301 571-9356  
+1 301 571-0178 FAX

ACT Networks, Inc.  
San Francisco, CA (USA)  
+1 415 438-2304  
+415 438 2305 FAX

ACT Networks, Inc.  
Santiago (Chile)  
+56 2-205-9460  
+56 2-239-4993



## Praxis

Continued from page 53

issue of moving data where and when its needed across the enterprise, according to Don DePalma, a senior analyst at Forrester Research, Inc. in Cambridge, Mass.

"They've got a really good product solution [for this problem], especially relative to your favorite database vendor or to [specialized] data warehouse vendors," he said.

### A MODEL WAY TO MOVE DATA

#### Praxis OmniEnterprise Architecture

##### Net administrator console

OmniDirector-graphical interface and tools with hooks to Praxis' server products

Enterprise Information Sharing Model-visually organized information and instructions for coordinating networkwide data movement

##### Server

<b>OmniReplicator</b> -copies any changes made to one database to all others	<b>OmniLoader</b> -extracts, moves and loads big database tables	<b>OmniCopy</b> -copies on schedule specific database tables to designated target databases
--	--	---

The new tools let companies create an application model that tells OmniReplicator as well as two new server programs how to move data over a network.

Perhaps the key innovation is the ability to create with OmniDirector's graphical tools a visual representation of the instructions and information for moving data among networked servers. Dubbed

## ODI

Continued from page 54

within the local browser.

Through ODI's middleware, PSE Pro can share data easily with server-based ObjectStore databases, O'Brian said.

"We're just starting to think of new applications that we couldn't do before [without local persistent storage]," said Eric Magleby, vice president of marketing at Alta Software, Inc., a Reston, Va., distributed object consulting company and PSE Pro beta site.

PSE Pro will let developers create applications that download advanced object models from ObjectStore servers, then use these models in handling complex financial transactions that take hours or days to complete.

PSE Pro for Java uses less than 250K bytes of memory. It is compatible with a range of popular Java development tools and runs on Windows 95, Windows NT 3.51 and 4.0, and Solaris 2.4 and 2.5.

The C++ version needs less than 300K bytes of memory and is compatible with ANSI C++ and Microsoft Foundation Classes. It runs on Windows 95 and Windows NT.

©ODI: (617) 674-5000.

the Enterprise Information Sharing Model (EISM), this information includes logical names and addresses of the source and target databases, the specific data that needs to be moved, copying schedules, what changes should be made to specific data elements and middleware connections.

"The EISM lets customers model their entire enterprise with the GUI and our schema language interface," said Jean-

nine Bartlett, Praxis' director of product marketing. "It simplifies the entire setup and management of the [database] nodes."

OmniLoader is aimed at selecting large tables or entire databases and loading them into a new database, such as a data warehouse. OmniCopy captures specific tables at a moment in time and copies them over the net to the designated targets. The existing OmniReplicator is able

to capture small changes to data and copy these to networked databases almost at once.

The products work with most popular server databases.

Pricing is based on each target and source database, and ranges from \$1,000 to \$90,000 in each case. OmniDirector is included in the price. All products will be available by year-end.

©Praxis: (800) 726-1234.

Headline:

# ATM, SONET Media converter and repeater

Photo:

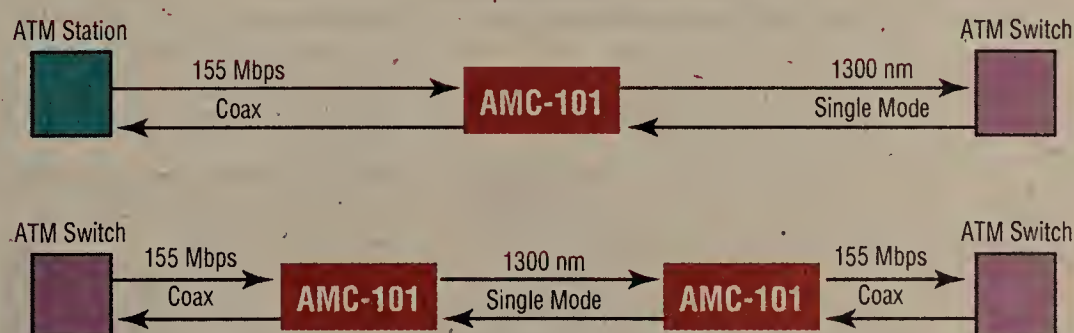


**Product name:** AMC-101

**Product description:** Modular high speed media converter and repeater

**Product benefit:** ATM **retimed media conversion/repeating** for OC-1, TAXI, OC-3 and STS-3c protocols at data rates up to **155 Mbps**. **Transparent conversion** of fiber signals for ATM, Ethernet, Token Ring or FDDI. Bi-directional mode conversion performed independently. Support of single or multimode **fiber, UTP, STP or coax**. Extended range of up to **30 miles**. A member of RAD's family of ATM products.

**Contact:** Toll free 1-800-444-7234 or [market@radusa.com](mailto:market@radusa.com) web: <http://www.rad.com>



Boring ads. Brilliant solutions.

**RAD**

data communications

RAD Data Communications, Inc.

e-mail: [market@radusa.com](mailto:market@radusa.com) Toll Free: 1-800-444-7234

U.S. Headquarters: 900 Corporate Drive, Mahwah, NJ 07430 Tel: 201/529-1100 Fax: 201/529-5777

Midwest: Tel: 847/342-9999 Fax: 847/342-9986 West Coast: Tel: 714/897-2448 Fax: 714/891-1764

International Headquarters: 8 Hanechoshet Street, Tel Aviv 69710 Israel Tel: 972-3-6458181 Fax: 972-3-6498250



## SHARED LOGIC

## Let's put an end to those YETAs

**F**or years, network directories have bedeviled customers.

Every application contains what Kim Cameron, chief scientist at Zoomit International, Inc., calls a YETA — short for Yet Another Directory. Every

directory provides a different schema and structure for naming information. Daniel Blum could appear in a network operating system directory as “dblum,” in the personnel directory as “Daniel Blum” and in an E-mail directory as “blumd.”

Multiple administrators must be involved in the costly process of adding or deleting a user from the directory. There is no single repository that a user or application can access to obtain consolidated information. Coveted single login capabilities remain on the drawing board.

Distributed client/server applications are directory-disabled instead of enabled.

However, there is light at the end of the directory tunnel.

Already, the Lightweight Directory Access Protocol (LDAP) has received significant vendor backing. LDAP provides a standards-based client/server directory protocol and an API. Vendors of new applications should now plan on coding LDAP calls instead of building YETAs — or be whipped with a wet noodle in the market. Thanks to LDAP, there should be no new YETAs. Unfortunately, integrating or exterminating existing YETAs is a much harder problem because it involves complex server-to-server directory interactions and interoperability with legacy directories.

Before standards-based technology can emerge to solve directory integration problems, there must exist a common model for such technology. Here's where X.500 was supposed to step in. However, like many standards, X.500 presumes displacement rather than coexistence with legacy systems.

Fortunately, a new meta-directory model seems to be emerging. At the July Burton Group Network Applications Consortium conference, Craig Burton presented his organization's “Meta-Directory Services” paper.

Meta directories provide the ability to join multiple directories using synchronization techniques and a superset of the name space in each directory. For example, a meta directory enables LDAP and Web access to entries for all corporate employees, and distributes a complete list of corporate E-mail addresses to legacy E-mail directories accessible through their native user interfaces.

During synchronization, meta directories enable rule-based exclusion of objects and attribute filtering. When synchronizing a corporate directory with NetWare 4.X, for example, you might want to obtain the user objects but not printers. When loading a personnel database into a more accessible corporate directory, filter out the salary attribute.

The meta directory must solve organizational and political problems, not create them. This means that it must be flexible enough to work smoothly within a variety of administrative models. It must be flexible enough to operate as the creator of data, the reflector of data, or even both simultaneously.

Directories are a problem today, but they will get fixed. LDAP is providing the industry with the breathing space it needs to move forward toward meta directories. Vendors should recognize the reality that directory enabling is too complex a problem for anyone to solve alone, and either provide or work with the meta directory solutions that will be coming out later in 1996 and 1997.

*Blum is a principal at Rapport Communication, a consultancy that focuses on messaging, groupware and electronic commerce. He can be reached at dblum@interramp.com.*



# The only trick they know is 24 pages per minute. So don't expect any real intelligence.

In this dog-eat-dog world, we've always found going beyond the pack more productive than chasing one's own tail.

So while others rolled around in old 32-bit technology, QMS purred along with an advanced 64-bit, 100 MHz controller powered by NEC's new V<sub>R</sub>4300 microprocessor, for superior performance on complex print jobs and graphics.

As they barked to marketing about end-user software, we perfected code that also gives administrators unprecedented power to monitor and control usage across the network.

And while they sat drooling over their profit projections, we added useful options like Imaging. Forms printing. Automatic stapling. Photocopying. The ability to replace line printers. And true 1200 dpi resolution.

So as you can see, with NEC's help we don't have to go out of our way to beat the competition. They've already licked themselves.



**The QMS® 2425 Print System.  
Swift. Sleek. Superior.**



Ask about our Cost-Per-Image Program.

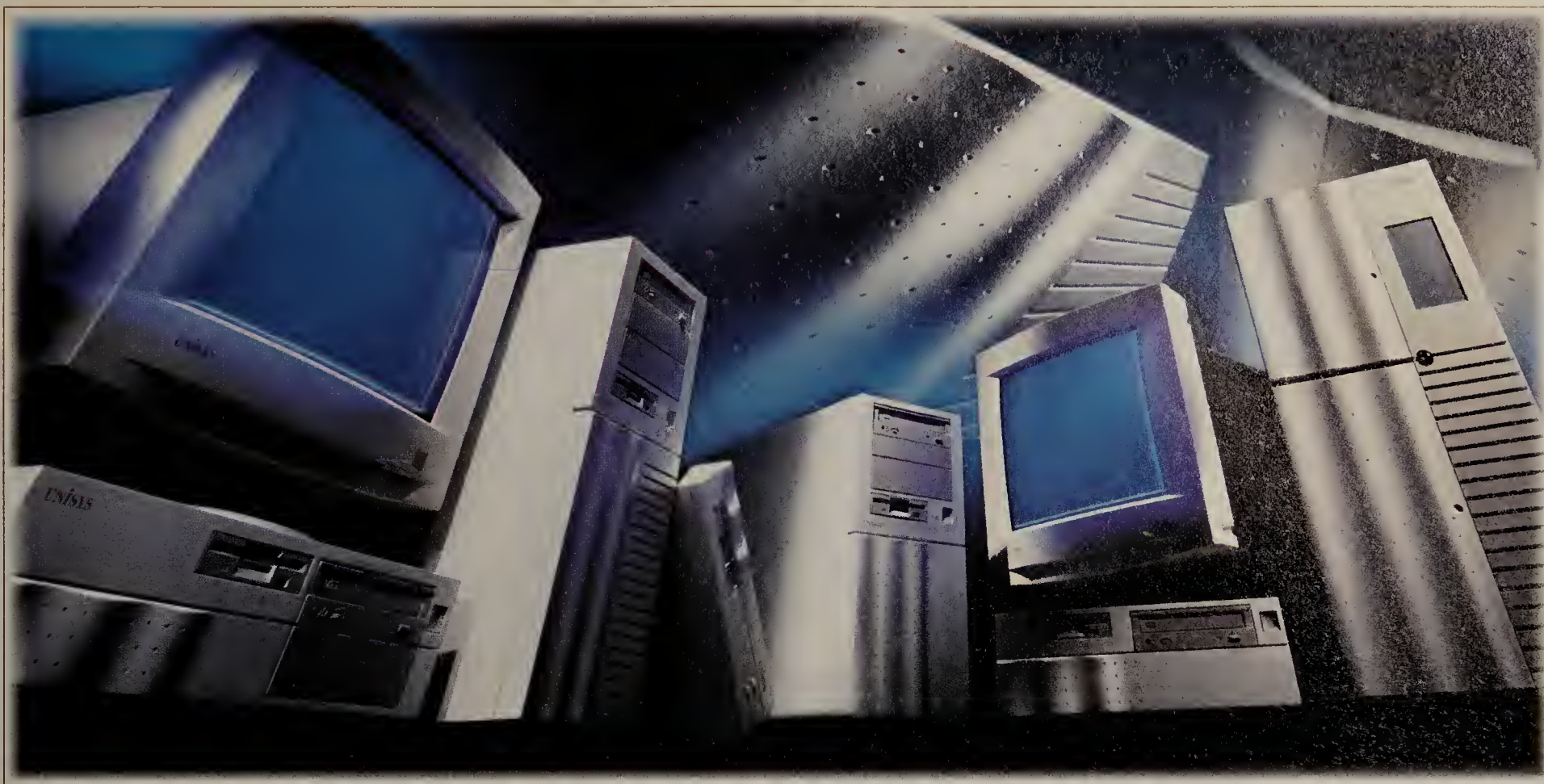
US: 800 392-7541 Dept. 5134 Canada: 800 268-0343 Internet: <http://www.qms.com/>  
For service on QMS or other products, call 800 762-8894 (U.S.) • Q-Fax 800 633-7213

QMS and the QMS logo are trademarks or registered trademarks of QMS, Inc. One Magnum Pass, Mobile, AL 36618, 334 633-4300. All other trademarks are the property of their respective companies. © QMS, Inc. 1996.



QMS 2425E Print System





## **Everything you're looking for in PCs.**

---

## **From a place you probably didn't look.**

You might not think of Unisys as a place to find state-of-the-art PCs for your company. But



all that's changed with *Aquanta*™ PCs and servers. This new product line matches—and even surpasses—the best

the PC world has to offer.

*Aquanta* means quality, with rigorous testing that ensures mainframe-class dependability for mission-critical applications.

*Aquanta* means performance, with one of the industry's most powerful and scalable product lines—including multiprocessor Pentium and

Pentium Pro models, SMP servers and fault-resilient servers.

*Aquanta* means compatibility, with support for all major operating systems and networks to simplify client/server computing.

*Aquanta* means support, through Unisys world-wide experience implementing technology across departments, companies and countries.

And finally, *Aquanta* means this: While we may not be the first place you look for PCs, we just might be the last.

<http://www.unisys.com/adv> or 1-800-874-8647, ext. 244

© 1996 Unisys Corporation. Aquanta is a trademark of Unisys Corporation. The Intel Inside Logo, Pentium and Pentium Pro are registered trademarks of Intel Corporation.

# UNISYS

The Information Management Company





# HIGH-SPEED DEDICATED SERVICE THAT'S DEDICATED TO THE NEEDS OF BUSINESS.

If you need high-speed Internet service for critical data or applications, you need business-class service. UUNET® is the only global Internet provider that's totally dedicated to business. So you get the superior high-speed performance you expect, thanks to our fully-redundant network with the most extensive T-3 backbone in the industry. UUNET gives your business built-in security, 24-hour customer service, and high-speed options that include 56 Kbps, burstable and fractional T-1, frame relay, SMDS, and tiered T-3 services. To put our high-speed experience to work, call 1 800 265 5606.

## THE INTERNET AT WORK™



<http://www.uu.net/nw1>    [info@uu.net](mailto:info@uu.net)

USA: +1 703 206 5600 Canada: +1 800 463 8123 UK: +44 (0) 1223 250 100 Belgium: +32 3 281 49 83  
Netherlands: +31 20 696 60 54 Luxembourg: +352 440 291 VARs/Resellers: +1 703 208 5269

©1996 UUNET Technologies, Inc., Fairfax, VA. All rights reserved. UUNET, UUNET Technologies and the UUNET logo are registered trademarks and The Internet at Work is a trademark of UUNET Technologies, Inc. All other marks are the property of their respective owners. Official Internet Access Provider to The Microsoft Network™



# Intranets & the 'Net

**Covering:** Internet Technologies and Services  
for Collaboration and Electronic Commerce

## Briefs

■ **Cylink Corp.** announced that its **SecureAccess** product family now uses a 128-bit proprietary encryption algorithm called **CEPA** for encrypting E-mail or files. According to Jim Omura, Cylink's acting chief executive officer, CEPA is stronger than the Data Encryption Standard (DES).

In addition, government regulations make it easier for users to export encryption products with proprietary algorithms. The SecureAccess system will now use both DES and CEPA, automatically switching from one to another when encrypted documents are transferred to it.

Cylink: (408) 523-5993.

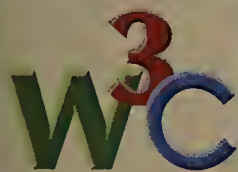
■ According to **Network Systems, Inc.**, its **BorderGuard** firewall has successfully completed a **testing regime** called **Security Proof of Concept Key-stone** devised by the **National Security Agency (NSA)**. Among other things, the NSA tests for protection against IP spoofing and the prevention of unauthorized access to public-key information during key exchange.

■ **Burlingame, Calif.-based start-up Hi/fn, Inc.** this week will unveil a line of microchips and software that combines data compression with encryption in a way said to **reduce network bandwidth requirements** by a 4-to-1 ratio. Hi/fn said it is now licensing the technology.

Hi/fn: (619) 794-4550.

■ **Japan's Keio University** has joined the **World Wide Web Consortium** to work closely

with two other member research organizations, the Laboratory



for Computer Science at the Massachusetts Institute of Technology and the French National Research Institute for research in Computer Science and Control. Tokyo-based Keio University will provide technical expertise and connections to Pacific Rim industry for development of the World-Wide Web.

## Banks invest in multimillion dollar cyberbanking network

**By Ellen Messmer**  
New York

Fifteen banks and IBM are investing millions to build a network that will let customers access banking applications from the Internet and private online services.

Once the network, called Integrion, is up and running early next year, bank customers using Web browsers will be able to pay bills online, check their accounts and transfer funds between them. The companies have not yet specified what security model they will use.

Integrion will not be as simple as putting up a secured Web site. IBM will have to score a systems integration triumph for Integrion to become the "all things to all people" network the banks want.

The banks are loathe to abandon other types of remote-banking technologies they have invested in over the years, including screen phones and

Corp., the third-party service provider that now holds 65% of the market.

IBM expects to earn revenues from Integrion based on transactional services such as bill-paying. Banc One Corp. and NationsBank, N.A. are going to be the first two institutions to go online in a pilot targeted for early next year.

"We're going to give them the ability to greet each customer with their own logo and to fortify their own banking relationship," said Lou Gerstner, IBM's chief executive officer, flanked by bank executives here during last week's announcement.

"By going together to build the system, we think there will be economies of scale," said John McCoy, chairman and CEO of Banc One.

The Integrion alliance, which will operate as a separate company, will be working to set elec-

### Banks investing in Integrion

ABN Amro	KeyCorp
Banc One	Mellon Bank
Bank of America	Michigan National Bank
Barnett Bank	NationsBank
Comerica	PNC Bank
First Bank Systems	Royal Bank of Canada
First Chicago NBD	Washington Mutual
Fleet Financial Group	

**The Integrion network, expected to debut next year, will let a customer bank over the Internet or private online services from a remote PC.**

online access through personal financial software, such as Microsoft Money or Intuit, Inc.'s Quicken.

Through Integrion, the IBM Global Network will provide bill-paying services, putting it in competition with Checkfree

## First Union readies Web-based home banking

**By Ellen Messmer**  
Charlotte, N.C.

By year-end, First Union Corp. plans to transform its Web site from the simple advertising role it plays today into an interactive home-banking and bill-paying medium.

First Union's Web site will become a place where the bank's 12 million customers across the country, using browsers with encryption support, can go to check accounts or transfer funds.

A key element of the plan was the integration of the bank's back-end databases with the Web. In turning for help, First Union did not go looking for the latest hotshot Web consultancy. Instead, the bank looked close to home and picked its long-time supplier of voice response units (VRU), InterVoice, Inc.

A VRU provider that knows Web standards, such as Java, Open Database Connectivity and Common Gateway Interface?

"We've been doing a lot of

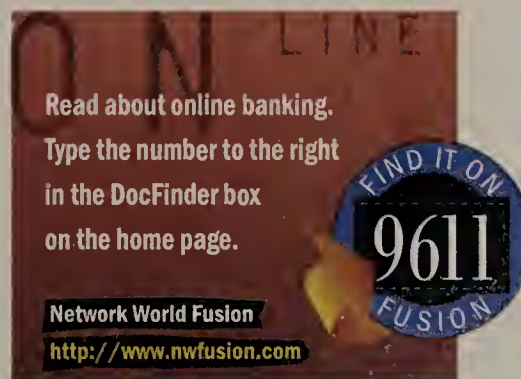
innovative things with them," explained Linda Gilch, vice president of First Union's automation division. "And they already have the [technical] knowledge about our bill-payment service provider."

InterVoice will be connecting First Union's secure Open Market, Inc. Web server to InterVoice HTTP middleware called VisualConnect. VisualConnect is a bridge between Web servers, corporate databases and third-party bill-paying networks.

VisualConnect is also the Web piece of a larger transaction-processing platform, OneVoice, which runs on an IBM OS/2-based system. The OneVoice software includes interfaces for handling user-initiated transactions between different networks. These could include the Internet, banking screen phones, fax machines, touch-tone interactive response

or credit-card networks, such as Visa or MasterCard.

OneVoice has interfaces to IBM mainframes as well as Digital Equipment Corp. and Hewlett-Packard Co. minicomputers, and can communicate with data-



bases from Oracle Corp. and Sybase, Inc.

Using this common platform means that First Union could easily set up a way that Web users, for instance, could have information about banking services faxed to them.

"We also have an interface to  
**See First Union, page 76**

tronic commerce standards such as those for bill-paying, McCoy said.

Gerstner said the Integrion network, which will eventually tie into utilities, retailers and airline networks for electronic commerce, will be based on open standards to be published in the near future.



"The APIs will be open and published so anyone who wants can build hardware and software for it," he said.

The banks' efforts to go online, which they acknowledge have not been terribly successful to date, last year shifted into high gear after Bill Gates, Microsoft Corp.'s outspoken chief executive, derided the banks as "dinosaurs." ■

## Internet access is made easy

**By Carol Sliwa**  
Foster City, Calif.

Silicon Valley start-up Whistle Communications, Inc. this week will unveil a toaster-shaped device designed to help small businesses, departments or remote offices, with one to 100 employees, hook in to the Internet.

Whistle's InterJet 100 software/hardware package will eliminate the need for companies to separately purchase Web server hardware and software, routers, E-mail software and firewall products, company officials claimed.

The product revolves around an 8M byte Intel 486-based server running Unix. It includes router software and a 1.2G byte hard drive. On the access side, it scales from 28.8K bit/sec to T-1 speeds; an integrated four-port hub; a built-in UPS power backup; and a 28.8K bit/sec modem for routing and out-of-band management.

Software bundled into the package includes an Apache  
**See Whistle, page 79**





More than



It  
doesn't  
always take  
3,000  
users to make remote access  
a priority for us.

It just takes one.

Shiva is focused on remote access. And only remote access. So with a Shiva solution, you can give users the seamless and simple access they need. Regardless of how many users you have.

This remote-centric philosophy has put

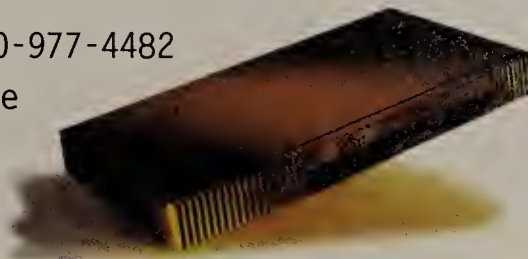
Shiva at the top of the remote access industry.

And Shiva technology at the center of remote access solutions in many successful organizations. Including names like John Deere and Virgin Atlantic.

They've discovered the secure, reliable connections Shiva is famous for. Like those from our LanRover family of remote access servers. LanRovers support IPX, TCP/IP, AppleTalk®, NetBEUI and 802.2/LLC protocols for dial-in, dial-out and LAN-to-LAN connectivity over analog and digital lines. And there's one for every size enterprise.

To learn more, call 1-800-977-4482 or visit our Web site. We'll be glad to show you how we'll build remote access solutions for all your user groups. One user at a time.

See more on the LanRover at [www.shiva.com](http://www.shiva.com)



*Shiva*  
The remote access specialists



The Shiva logo and LanRover are registered trademarks of Shiva Corporation. All other product names are trademarks or registered trademarks of their respective owners.



# CyberGuard lights up firewall

Department of Defense certified operating system gives sense of security.

By Ellen Messmer  
Atlanta

At NetWorld+Interop 96 this week, CyberGuard Corp. will unveil a new network firewall and a line of remote-access secu-

rity products that give organizations a way to control access from the Internet.

The CyberGuard Firewall 3.0 runs on an Intel-based Unix platform with a hardened operating system that meets the

Department of Defense's B2-level security requirements.

Previously, CyberGuard's firewall, used mostly by the military, had operated on the proprietary Nighthawk operating system and hardware.

Corporations that want to install several CyberGuard 3.0 firewalls, either to control access to the Internet or patrol LAN

segments inside the corporate intranet, will be able to manage them all from a central location, said Katherine Hutchison,

CyberGuard's vice president of corporate development. CyberGuard is expected to cost about \$10,000.

CyberGuard, partnering with encryption provider Information Resource Engineering, Inc. (IRE), will also be demonstrating SafeNet Enterprise, a version of

the CyberGuard 3.0 firewall that can provide user authentication and data encryption. The SafeNet firewall is expected to start at \$13,995.

When users install SafeNet Soft, a \$25 Windows-based client using private-key or public-key encryption, they can authenticate their identities at the firewall with a  
*See CyberGuard, page 79*



## TO SELECT THE BEST BANDWIDTH, YOU NEED THE RIGHT TOOLS.

**Not since the '60s British invasion has anyone sent a message to the world as powerfully as Dynatech. Or as versatily.**

It's a new age. And messages are traveling at a range of speeds and resolutions unheard of even a decade ago.

❖ Dynatech's DynaStar™ Portfolio scales each communication to meet its specific needs. Saving you big money. And changing the world of networking to a place of far greater peace and harmony.

❖ Next time you want to connect with the world, do it with the most powerful tools at your fingertips. Instruments that make the shifts across platforms, protocols, bandwidths and destinations smoothly, simply, seamlessly. Giving you and every department that depends upon your network more time to...rock and roll.

❖ For more about DynaStar, here's a hot number you should remember...

**800-727-7215.**

*Come see us at  
Networld+ Interop  
Atlanta '96,  
Booth #2228*

**DYNATECH**  
COMMUNICATIONS, INC.  
...The Power To Simply Connect

<http://www.dynatech.com>

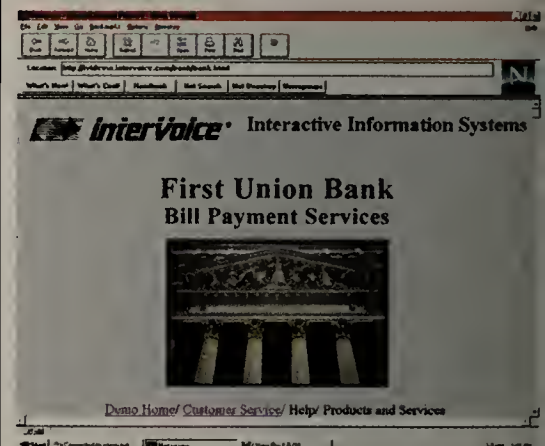
## First Union

*Continued from page 73*

Netscape's CoolTalk Internet phone," said Mike Polcyn, InterVoice vice president of marketing.

"So we could take advantage of an Internet phone to play a stored message to person at the browser," he said.

With the knowledge that not everyone on the 'Net uses the same type of browser, First Union plans to set up its cyberbanking Web site to present information to cus-



**First Union's Web site right now is just for advertising, but by year-end, it is going to become a medium for interactive home banking.**

tomers in three ways: simple HTML, HTML with graphics; and Java.

"We're mainly using Java for visual impact, like rotating graphics," said Gilch, adding that Java still "needs more tools and a security model." But ideally, First Union would likely use Java on its Web site to expedite what-if calculations about investment strategies and market rates.

First Union was not part of the 15-member bank consortium that chose IBM as its partner last week to build the Integration Financial Network (see related story, page 73).

While sketchily detailed, the IBM-built network is slated to provide similar bill-paying and home-banking services for 15 banks, including NationsBank Corp., by early next year.

Gilch said First Union is not opposed to the IBM cyberbanking venture but is already well along with its own technical plans. ■



# The Web without the wait.

## AS/400 Advanced Series

Now, there's a faster way to move your business to the Internet, while avoiding timely and costly delays: AS/400<sup>®</sup> Advanced Series.

With Internet Connection for AS/400, you can quickly transform your AS/400 into a Web server. Create a home page. Develop new Web applications without retraining staff. Even automatically Web-enable over 25,000 AS/400 applications. On the fly. Without having to rewrite your software. (No one else can make this promise.)

And, because everything you'll need to connect to the Internet

is integrated into the architecture of AS/400, doing business on the Web takes a lot less work. Not to mention, a lot less time.

Add to that its proven reliability and security features and you'll see why AS/400 Advanced Series isn't only a faster way to the Web, but a safer one, as well.

If your business is ready for the Web, start with a Web server that's ready to go. Visit us at [www.as400.ibm.com/connect](http://www.as400.ibm.com/connect) or call 1 800 IBM-4YOU, Priority Code GAS6B001.

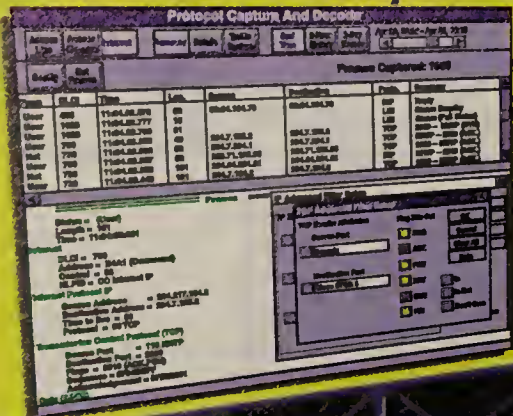
Solutions for a small planet<sup>™</sup>



# SOME WORDS OF ADVICE ABOUT DSUs FOR YOUR INTERNET ACCESS...

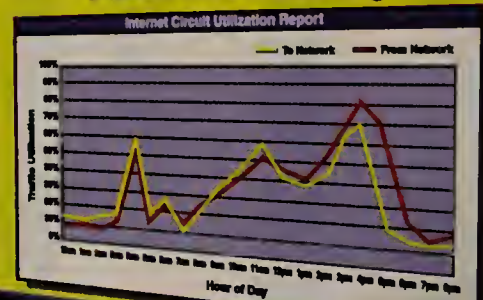
**Get Real**

## Performance Analysis



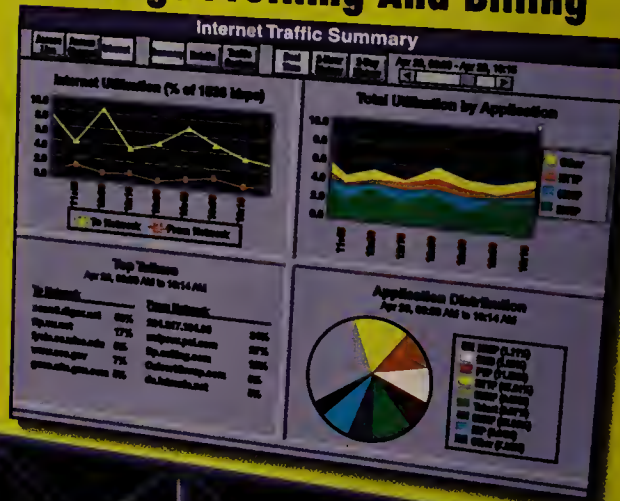
**Get Real**

## Bandwidth Planning



**Get Real**

## Usage Profiling And Billing



**Get  
Visual  
OnRamp!**

A **Real** Managed Internet Access Device

Call us toll-free at 888-I'NET-DSU  
or visit us at <http://www.visualnetworks.com>

**Really Slick**

**VISUAL**  
NETWORKS

... See the performance



## Get megabit-rate Internet & LAN access with Campus area network products.

Mail this prepaid card or call 800-370-9670 to receive  
more information on PairGain products.

- ☐ Send me information on PairGain's Campus area network solutions
- ☐ Send me PairGain's free technology brief on HDSL
- ☐ Send me additional information on other PairGain products
- ☐ Have a PairGain representative call me

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

E-mail Address \_\_\_\_\_

**PAIRGAIN**  
THE COPPEROPTICS COMPANY





NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**

FIRST-CLASS MAIL PERMIT NO. 2066 TUSTIN CA

POSTAGE WILL BE PAID BY THE ADDRESSEE



PAIRGAIN TECHNOLOGIES  
14402 FRANKLIN AVE  
TUSTIN CA 92680-9638





# Whistle

Continued from page 73

HTTP server, Adobe Systems, Inc.'s Page-Mill 2.0 Web publisher (one-user license), Qualcomm, Inc.'s Eudora Lite mail client (site license) and Netscape Communications Corp.'s Navigator 2.0 client (site license).



## WHISTLE'S INTERJET 100 INCLUDES:

- ▶ 1.2G-byte hard drive
- ▶ Unix-based server/router
- ▶ 28.8K bit/sec modem
- ▶ Apache HTTP server
- ▶ Web publishing, browsing and mail client software

InterJet will be sold and leased through Internet service providers. Whistle is working to finalize deals with NetCom On-Line Communication Services, Inc., PSINet, Inc. and other ISPs, said Gordon Ritter, Whistle's vice president of

marketing and business development.

Under the envisioned setup, customers simply will call up an ISP and specify the type of connections they want. The ISP then will send out a confirmation fax and ship the InterJet device.

The InterJet 100 hardware plugs into any Ethernet LAN at one end and a phone line at the other, whether standard dial-on-demand 28.8K bit/sec, ISDN or frame relay (56K bit/sec to T-1).

The customer types a registration code and phone number into InterJet's keypad located on the front of the hardware unit.

Then InterJet dials the ISP with the confirmation information and automatically configures the connection through InterJet Commander software running on the ISP's system. An ISP that supports the InterJet product is required.

InterJet Commander software handles billing, customer account information, IP

address databases, router configuration, Web site mirroring and E-mail store-and-forward functions. Software agents running on the hardware at the InterJet customer site can monitor and manage various tasks of the machine, such as connection speeds and storage demands.

InterJet 100 will begin shipping in October for \$1,995. Leasing options also are available.

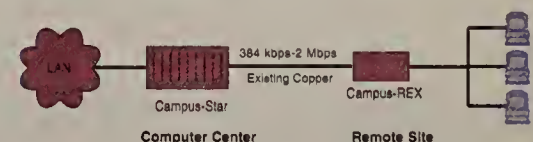
©Whistle: (888) 494-4785.

## Now Midwest State can have a surfing team.

Internet and LAN access at megabit rates to every dorm room, over existing copper wire.

Presenting inexpensive, high-speed access to on- and off-campus buildings, with PairGain's proven campus area network products. PairGain's family of Campus products complement your fiber-optic backbone by delivering high-speed data services to your end users quickly and cost-effectively. By using existing copper cable and PairGain's CopperOptics™ xDSL solutions, you can provide students and faculty with quick access to the Internet or the campus fiber backbone.

Based on High-bit-rate Digital Subscriber Line (HDSL) transmission technology, Campus-Star™, Campus-REX™ and Megabit Modem™ products install in minutes to connect remote Ethernet sites to the backbone. Cost-effective voice, data and video applications like distance learning and Internet access are instantly at hand, at variable transmission rates from 384 kbps to 2 Mbps, at distances up to five miles.



Too far from the waves to surf? Let PairGain bring them to you. Extend the power of your network, with PairGain's market-leading campus area network products.

For complete information see our web site or call today at 800-370-9670.

**PAIRGAIN**  
THE COPPEROPTICS COMPANY

<http://www.pairgain.com>

Circle Reader Service #84

PairGain Technologies, Inc. 14402 Franklin Avenue, Tustin, CA 92780-7013, USA • 714-832-9922 • 800-370-9670 • Fax 714-832-9924 • PairGain is a registered trademark and CopperOptics, Campus-Star, Campus-REX and Megabit Modem are trademarks of PairGain Technologies, Inc. ©1996 PairGain Technologies, Inc.

NetworkWorld • September 16, 1996 • [www.nwfusion.com](http://www.nwfusion.com) • 79

# CyberGuard

Continued from page 76

combination of an encryption key and a personal identification number.

"The user authentication and onetime passwords are based on the ANSI X9.26 standard for challenge and response," Hutchison said. CyberGuard and IRE are also fielding a smart-card version of the client authentication software, costing about \$95.



Hutchison, VP of corporate development at CyberGuard, says the new Firewall will have central management controls.

In addition, CyberGuard and IRE have developed a \$695 portable secure modem running at 28.8K bit/sec that can also play the client role, encrypting the data and authenticating the user.

The SafeNet product line will be offered with the Digital Encryption Standard algorithm, which is not easily exportable, or a 40-bit algorithm called Atlas, which is.

CyberGuard will be certifying resellers for the new security line under a program called Security Partner Alliance.

©CyberGuard: (800) 666-4544, Ext. 5615; Information Resource Engineering: (410) 931-7583.

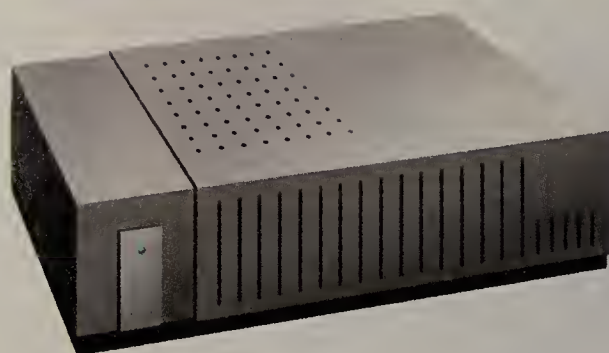




# These will run your Corporate Intranet...



Modem / 28.8 Kbps



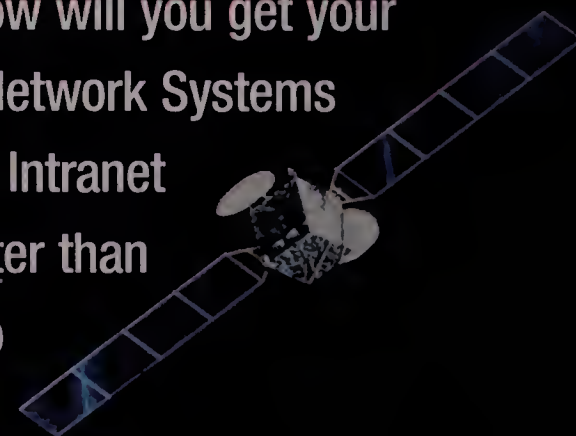
Frame Relay / 56 Kbps



ISDN / 128 Kbps

## HUGHES NETWORK SYSTEMS SATELLITE BASED INTRANET DELIVERY.

You've heard all the buzz about Intranets, but how will you get your Corporate Intranet off the ground? Hughes Network Systems (HNS) has the ideal solution for solving the Intranet delivery problem: getting high speed (greater than 200Kbps) from your corporate web server to remote locations.



SEE OUR LIVE DEMONSTRATION  
NETWORKS INTEROP ATLANTA  
BOOTH #2844  
SEPT. 18-20



# This will make it fly.

Satellite  
Greater Than  
200 Kbps

Discover the power of the Intranet for your corporate applications. Use Internet technology to support your corporate applications with multimedia rich features such as real-time video and audio. Hughes can deliver an entire turnkey solution for your company that will adapt to and expand with your corporate application needs. For more information about getting your Corporate Intranet off the ground, call 301-428-5622.

**HUGHES**  
NETWORK SYSTEMS

A HUGHES ELECTRONICS COMPANY

<http://www.hns.com>

Netscape Communications, the Netscape Communications logo, Netscape, and Netscape Navigator are trademarks of Netscape Communications Corporation. Netscape has not endorsed or otherwise sponsored the advertised product or service.

Circle Reader Service #55



# THANKS.

Let's be honest. Having our NetServers showered with accolades is a kick.

Besides, it shows how serious we are about building quality network systems.

For detailed specs, visit <http://www.hp.com/go/netserver>. Or call 1-800-533-1333, Ext. 1688.

HP NETSERVERS

**LAN**  
PRODUCTS  
OF THE  
YEAR

**PC**  
MAGAZINE  
EDITORS'  
CHOICE

March 26, 1996  
HP NetServer 5/133 LH

PCComputing  
**BEST**

Computer  
Reseller News

**CHANNEL  
CHAMPION**  
1995

EDITOR REFUSES  
TO GIVE IT  
BACK  
**NETWORK  
COMPUTING**

intel  
inside  
**pentium**  
PROCESSOR

**MVP**  
PCComputing

Pictured: the HP NetServer 5/100 LH. Awards shown: PC Magazine Editors' Choice HP NetServer 5/133 LH; PC Computing BEST HP NetServer 5/133 LS2; LAN Magazine Products of the Year HP NetServer LS Series; Network Computing Editor Refuses to Give It Back Award HP NetServer 5/100 LS4; PC Computing MVP HP NetServer 5/100 LH; Computer Reseller News Channel Champion Award NetServer Series. The Intel Inside logo and Pentium are registered trademarks of Intel Corp. ©1996 Hewlett-Packard Company PTG433

**hp** HEWLETT®  
PACKARD



# Technology Update

Keeping Up with Network Technologies and Standards

## NETWORK HELP DESK

Network World tracks down answers to your questions. Please submit them to Chris Nerney via phone at (800) 622-1108, Ext. 451, the Internet at [cnerney@nww.com](mailto:cnerney@nww.com) or fax at (508) 820-1103.

**I'm evaluating the use of ATM for a corporatewide network, and someone mentioned that I could create a virtual private network (VPN) of sorts. He didn't really know how, though. Thanks for any help you can give me on this subject.**

### Via the Internet

Your colleague may be thinking about ATM virtual trunking. As we described in a recent Technology Update, ATM virtual trunking provides a way for companies to build hybrid public/private networks (*NW*, April 15, page 37). ATM virtual trunking is similar to the VPN services carriers offer for voice traffic. Unlike VPN service, however, virtual trunking relies more on private ATM switches than on carrier facilities, explains the article's author Simon Banks, enterprise networks marketing manager at StrataCom, Inc., (now Cisco Systems, Inc.'s Wide Area Network Business Unit).

The enterprise switches use virtual paths to extend congestion management and other value-added features across the public network, Banks says. With virtual trunking, network managers can centrally control remote ATM switches.

With virtual trunking, you'll also be able to run various-speed trunks from each of your corporate locations into the public ATM network. As Banks points out, this means a site with a 1.544M bit/sec trunk can connect to a site with a 155M bit/sec trunk using a virtual path while other sites connect at 45M bit/sec into the same location. Without virtual trunking, a point-to-point physical 45M bit/sec trunk would require a 45M bit/sec leased line, for example.

Virtual trunking also enables the use of enterprise-based switched virtual circuits over a public ATM network that does not directly support SVCs, Banks says. This is because virtual trunking lets enterprise ATM equipment create SVCs within the virtual paths crossing the public network.

You should note, however, that standards do not yet exist for virtual trunking technology.

## Transparent LAN service opens up WAN connectivity opportunities

*Native interfaces help network managers extend LAN connections across the wide area.*

**By Jon Fjeld**

A doctor at a Chicago hospital is evaluating his patient and would like to consult with a specialist at a hospital across town. The patient is in critical condition and requires urgent attention — the consultation must happen immediately, and the patient's medical records and diagnostics must be available in real time to both the treating physician and the specialist. The patient is not stable enough to transport across town, and it would take too long and be too expensive for the specialist to come to the hospital.

If the hospitals were connected by a high-speed network, the X-ray files and patient's medical history could be converted into an electronic file and transmitted immediately to the specialist. A videoconference could be used to facilitate a consultation with almost no wasted time. Finally, the treating physician and the specialist could have simultaneous access to the patient's medical history, diagnostics and the patient himself.

Rather than having to mess with the expense and details of establishing and maintaining a dedicated link between the two

service makes geographically distant locations appear to be part of the same LAN. Thus, companies do not have to invest in WAN expertise or equipment. The end user or users — in this case, the hospitals — need only supply

working. At the same time, the transparent LAN service solution is cost-effective. Because service providers can take advantage of economies of scale to provide transparent LAN service, a company can subscribe for less

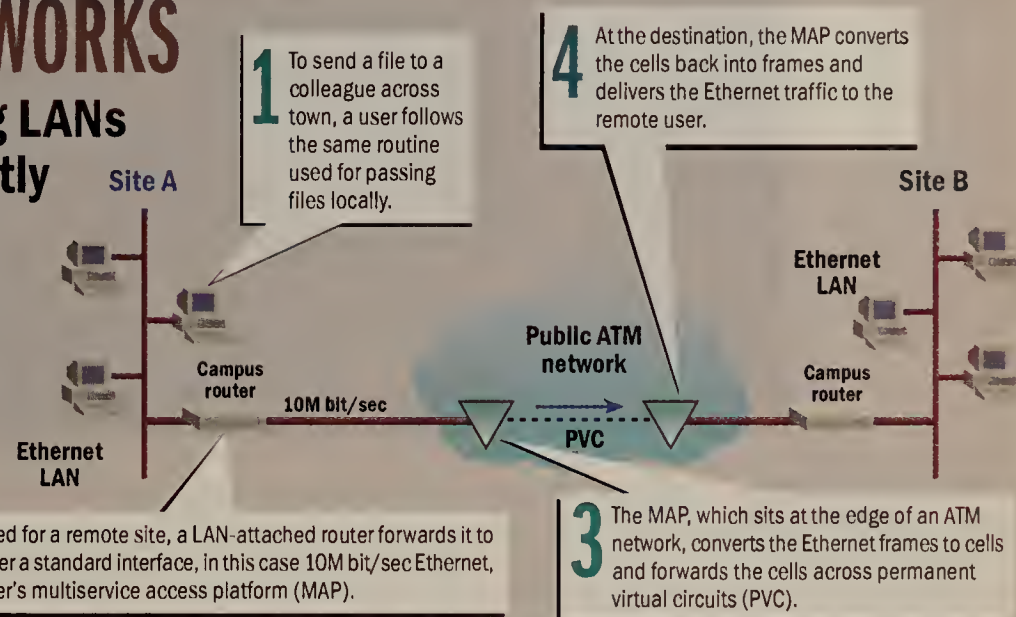
LAN service networks use a tiered architecture. A multiservice access platform (MAP) connects to customers via a native LAN interface, and then consolidates the traffic and hands it to the backbone network. The backbone network, which is typically ATM-based, switches the traffic to its destination where it is once again delivered to the customer through a MAP.

Transparent LAN service is a painless, plug-and-play solution for interconnecting LANs over great distances. Companies can

## HOW IT WORKS

### Connecting LANs transparently

Transparent LAN service lets users communicate with each other across the wide area as if they were physically located on the same local network.



a LAN connection from each site and the service provider can seamlessly interconnect the sites across a metropolitan-area network (MAN) or a WAN.

Customers connect to the service provider's network via a LAN interface, such as Ethernet, token ring or FDDI. Transparent LAN service often uses a high-speed ATM network backbone that can support native LAN rates — 10M and 100M bit/sec for Ethernet and 4M and 16M bit/sec for token ring. Interoperability between LANs and WANs operating at different speeds is not a problem. Because transparent LAN service is provided using a native LAN interface, customers do not have to worry about purchasing WAN equipment or learning new technologies such as ATM.

Transparent LAN service provides a variety of benefits. For example, users can rapidly and securely transmit volumes of data over great distances without having to deal with the complexities involved in wide-area net-

money than it would take to build, manage and maintain its own MAN or WAN.

Transparent LAN service has been available for approximately three years. Most regional Bell operating companies and some competitive access providers, including MFS WorldCom and Teleport Communications Group, offer the service.

### User view

From the user's perspective, transparent LAN service looks like an extension of the corporate LAN. Because connection to the service is made through a LAN interface, WAN customer premises equipment is not required. Traffic is bridged across the service in a secure and private manner.

The customer's network model really becomes that of a campus network, with a backbone LAN interconnecting buildings. This simplification of the network model eases network management considerably.

From the service provider's perspective, most transparent

focus on their core business and the net becomes as transparent as a utility. And if it could help physicians relay critical, data-intensive information immediately about patients in life-or-death situations, just imagine what transparent LAN service could do for your business.

*Fjeld is vice president of marketing for NetEdge Systems, Inc., a Research Triangle Park, N.C., company that provides ATM and other equipment to carriers so they can offer LAN-based services. The company can be reached by phone at (800) 638-3343 or the World-Wide Web [at] <http://www.netedge.com>.*

## Need information?

Let *Network World* provide a quick primer on an important or emerging technology. If you have an idea for Technology Update, contact Beth Schultz by phone at (312) 283-0213 or via the Internet at [bschultz@nww.com](mailto:bschultz@nww.com).

For more information on transparent LAN service, head to Network World Fusion.

**9606**

Type the above number in the DocFinder box on the home page.

<http://www.nwfusion.com>

sites, the hospitals could subscribe to a transparent LAN service to interconnect their networks at high speed.

### Transparent connections

Simply put, transparent LAN service is an end-to-end service that connects remote LANs. The beauty of this solution is that the



# NOW WE HAVE A WAY TO GET YOU FROM HERE



You are here. Your network is sprouting up like an out-of-control weed here, here, here and here. And it's probably not going to stop growing any time soon. Clearly, what's needed here is a solution that can keep pace with your expanding enterprise.



*This is the Compaq Netelligent 8500 Communications Platform. (But you can just ask for our new router.)*

working products. And like all great products, ours started with great companies. By making Thomas-Conrad and Networth part of Compaq, we're able to combine their industry-leading products with our networked computer experience. And provide you with high-quality,

Compaq Netelligent is our complete line of net- highly reliable solutions for your network.





TO HERE.

Solutions like our new Netelligent routers. Based on CiscoIOS™ software, and developed in partnership with Cisco Systems, our routers are not only highly scalable, they're highly affordable. (Just right for your expanding network.) And as it grows, we think you'll appreciate features like multiple expansion slots and a uniquely designed service tray that helps reduce maintenance costs. And because they're based on open standards, our

routers are easy to integrate into your existing system.

Of course, as good as they are, Netelligent routers are just one part of our complete line of networking products. To find out more about Compaq Netelligent, visit our Web site at [www.compaq.com](http://www.compaq.com).

A network that runs like clockwork? Who says you can't get there from here? Certainly not us.

**COMPAQ**

Has It Changed Your Life Yet?



## EDITORIAL INSIGHTS

### A gem of a service

**D**o yourself a favor sometime soon: Call up your favorite local carrier and say you want ADSL just as soon as you can get it.

ADSL, or Asymmetrical Digital Subscriber Line, makes more sense than any service I've seen since frame relay debuted back in the late '80s.

Over your existing copper phone lines, you can receive data at up to 8M bit/sec, with an upstream channel of 16K to 1M bit/sec. And over the same line, you still get a regular voice phone channel. (This is a gross simplification; see our feature on page 118 for the full story.)

If it sounds like this is the perfect vehicle for curing your Internet access woes, it is — not to mention a potential option for high-speed access to frame relay and ATM services. And if it sounds like it's similar to Basic Rate ISDN — essentially three channels over one line — it's that, too.



But that's where the similarities end.

First, ADSL is lots faster than ISDN, even Primary Rate, never mind BRI. And to support ISDN, carriers have to upgrade expensive central office switches, which they are usually loathe to do without pent-up demand.

Finally, ISDN is just too complicated. You can't expect the salespeople and administrative personnel populating small remote offices, where you likely need ISDN most, to configure most of the equipment it requires.

But I'm predicting ADSL will be different. The demand argument, for one, goes out the window. The equipment used to support ADSL can be installed piecemeal — a couple modems here, a couple there, as demand warrants.

Initial costs are in the \$2,000 range per line, and before too long, it should be much less. If you make enough noise, carriers have no real excuse not to outfit you with the service. And the prices carriers are talking about — averaging about \$50 to \$100 per line each month — are an unqualified bargain for that much bandwidth. (Especially if it includes your regular phone service, although that's not yet clear.)

The complexity question has yet to play out. Right now, there are two ADSL standards in play, but there appears to be agreement that has to be fixed, in order to avoid interoperability problems.

To their credit, every RBOC has ADSL trials in the works. If I were in your shoes, I'd try to get in on the fun.

Paul Desmond, features editor

pdesmond@nww.com

## Intranet management: It won't work until we take a different view

**I**f you want to generate an admiring crowd these days, just shout, "Intranet management." Reporters will flock in such numbers as to put you at serious risk of being crushed.

But everything that's got cachet is not necessarily ready for prime time. In fact, wildly popular technologies are often subjected to less cynical scrutiny than they deserve, and intranet management is such a concept.

The central problem with intranet management is network management in general is highly device-oriented. That's probably not surprising given the fact that networks are composed of devices. However, it does pose a special challenge when the devices used to create a network aren't dedicated to that mission.

We all know that intranets are made up of routers, servers, LANs, links and so forth. But instead of buying new iron, most companies are overlaying their intranets on the existing infrastructure. So what devices do intranet managers manage? Either the devices that support, in any part, the intranet (almost all) or the devices they bought (none).

The manage-nothing scenario has a certain surface appeal. You're the intranet manager, but you have nothing in particular to manage. Maybe you golf a lot, catch a few rays. A happy picture, but probably not a realistic one.

A more likely outcome is the following conversation with the CEO:

"Say, how's the old intranet running today?" the CEO asks.

"Gosh, I haven't got a clue. Why don't you sign on and give it a shot?" responds the intranet manager, thereby ensuring a career lifetime measured in hours.

Do you feel like giving this approach a try?

The manage-a-piece-of-everything scenario also presents problems. Chances are good that each of the managers will try to use it for his or her own purposes — which may not coincide with those of the other manager.

The fact is that intranets present a completely new situation for the enterprise manager — a kind of network without portfolio. Intranets are service overlays, and a service overlay network is really more like a carrier service offering than a traditional user network.

Intranet users don't think of themselves as consuming routers. They see themselves as consuming information, which is a network service. What they'd really like to have is a service view — a description of the connections and quality of service they can expect — just as users of a carrier frame relay network would like a management view that shows their particular set of service connections and nothing else.

Most intranet builders also favor a service view. If intranets do not consist of specific, dedicated network devices, they reason, why stick intranet managers with management systems designed for



Thomas Nolle

people who manage devices?

We can see from some of the trends in carrier management how service networks would work. The description of the connections and quality of service associated with the service view would be converted into a set of virtual network objects that would be linked to the real devices. Service managers and

users could see and possibly control these virtual network objects. Any changes they are permitted to make would be reflected downward to the real network based on rules that control just the part of real network resources this particular service is allowed to consume.

New interest in World-Wide Web-based management tools may appear to be a path toward logical intranet management. However, management architecture isn't determined by the gadget the user looks through in to the network, but by the way management information is collected and stored.

Concepts such as the proposed HyperMedia Management Protocol may provide a standard for a management-center-to-management-user connection, but we're still likely to be managing devices down in the core of that management center. Vendors such as Hewlett-Packard Co., IBM, Novell, Inc. and Sun Microsystems, Inc. have Web-based viewer support, but none have flexible service-view support. Intranet management apparently means managing *from* the intranet, not managing the intranet itself.

With all the interest in Web-based management, we're missing the boat here. Instead of trying to figure out how to deliver intranet management through a multikilobuck software product on a Unix workstation of similar price, why not just do the job using the same Web tools that make up the intranets in the first place?

Recently, vendors have been promoting Java as the new wave of management applications. Why not write an application to collect data from SNMP Management Information Bases and use Java or other Web software to project a service view? Even if the product didn't deal with the admittedly complex issue of control of real devices shared by several overlay network users, it would at least allow an intranet manager to report to the CEO on the health of the intranet. As long as we can't do that without analyzing the whole company network device by device, intranet management will be a myth.

Expecting an intranet manager to rely on the traditional management tools network builders use, when there is rarely any real network building going on, ensures the failure of both the intranet manager and the intranet.

Nolle is president of CIMI Corp., a technology assessment firm located in Voorhees, N.J. He can be reached at (609) 753-0004 or at tnolle@ix.netcom.com.

*The fact is, intranets present a completely new situation for the enterprise manager — a kind of network without portfolio. They are service overlays, which are more like carrier service offerings than traditional user networks.*

## Teletoons

By Phil Frank and Joe Troise  
baba@sfgate.com













MIER'S NETCETERA

## Some guidelines for switching to switches

**Y**es, switching is new — and hot. But before you go and plop down a small fortune to replace your hubs, multistation access units and perhaps even your older bridges and routers, how do you know you're getting a good buy?

Well, we just finished the first definitive analysis of this explosive new marketplace — assessing more than 120 discrete switching models from more than 50 vendors. Here's what we found:

■ If you're paying more than \$439 per switched Ethernet port, you're probably paying too much. That's the average for Ethernet-only switches up to 12 ports. And that's U.S. list price, so you should be able to get 25% to 30% discounted from that, especially if you're buying in quantity.

■ It costs more per Ethernet port for switch configurations supporting more than 12 ports. That's because a much more powerful central-switching engine is required (and more buffers, memory and so on). For switches with more than 13 ports, the average nudges up to \$678 per Ethernet port and stays at that price for switches with as many as 50 ports. The price tag climbs a tad more, to \$746 per Ethernet port, for the handful of switches that can handle more than 50 ports.

■ If you're a token-ring user, your choices are more limited and your prices are higher. So what else is new, right? Even for the lowest end token-ring switches with as many as 12 ports, the average price per port is \$814. That price more than doubles, to \$1,889 per token-ring port, for the three switches we located that can switch up to 24 token-ring ports.

■ Believe it or not, you can get a high-end switch packed with 100Base-T ports that costs less per port than a high-end token-ring switch. For 100Base-T switches with nine or more ports, the average per-port price is \$1,834. So you can be switching 100Mbit/sec ports for less than 16Mbit/sec ports. What's wrong with this picture?



Edwin Mier

■ It costs a little less to add a 155M bit/sec ATM uplink to an Ethernet switch than it does to add a 100Mbit/sec 100Base-T uplink. The average modular add-on price is \$1,766 per ATM uplink, but it increases to \$2,021 per 100Base-T uplink.

■ You can get a switch that accommodates any mix of LAN types. There's even a couple that support 100VG-AnyLAN (groan). But by far the biggest selection is offered for switches that do a mix of Ethernet and 100Base-T (including those with autosensing 10M/100M bit/sec ports). The next biggest class is Ethernet-only switches, followed by a group that can do Ethernet, 100Base-T and FDDI/Copper Distributed Data Interface.

■ You should insist on at least a one-year hardware replacement warranty. That's what 57% of vendors now offer. Eight percent only offer 90-day warranties, while slightly more than 25% offer full three-year warranties.

■ Cut-through vs. store-and-forward is no longer an issue. Based on data the vendors supplied to us, the average latency for a minimum-size packet through a cut-through switch is 45.9 microsec, while the average latency through store-and-forward switch models is 51.5 microsec. Talk about splitting hairs.

We've noted some unusual problems with cut-through switching in our lab-testing of switches — problems that don't appear with store-and-forward switches. So everything else being equal — and, from a performance point of view, it pretty much is — stick with store-and-forward switches.

*Mier is a contributing editor to Network World and president of Mier Communications, Inc., a Princeton Junction, N.J.-based networking consultancy, product test center and technical publisher. The data presented here was excerpted from The Switch Book, a 300-page special report. Mier can be reached at (609) 275-7311 or via the Internet at ed@mier.com.*

## MESSAGE



## QUEUE

### Musings on Microsoft

Your editorial "Microsoft unfairly slapped" (Aug. 12, page 32) was a bit contrived. Although Microsoft Corp. has the right to license its software however it pleases, what pleases Microsoft in this case seems to be somewhat disingenuous.

The Windows NT Workstation 4.0 beta 10-connection flap was well covered in the trade press, and Microsoft backed down on an issue it knew it would not win. Microsoft made the mistake of not paying any attention to the World-Wide Web when NT 3.5X was released, then tried to make up for this by putting some restrictive language in the 4.0 NT Workstation license. The argument is not over file and print services via the Microsoft Network, but TCP/IP connections, which Microsoft seems to have acknowledged as valid rather late in the game.

It looks like Microsoft may be playing the Apple Computer, Inc. game: Define a small market early on, then, as people find some use for the company's products, show them the disrespect that they deserve. In the end, it won't be Netscape Communications Corp. or the Department of Justice that will punish Microsoft — it will be us.

*Dennis Perkins  
Senior integration consultant  
GenRad, Inc.  
Irvine, Calif.*

Your editorial on Microsoft hit the nail on the head: Netscape doesn't have a network operating system, and Internet Information Server coming "free" with NT 4.0 makes it that much harder to sell Netscape products. What the Netscape folks have to ask themselves is this: If they *did* market a NOS, would they bundle a Web server with it? As you noted, Novell seems to think it is a valid idea. Netscape should concentrate on building a better product, especially on non-NT platforms, where Netscape still rules the roost.

*Don Jones  
System operator  
The Electronics Boutique  
West Chester, Pa.*

### One-sided view

Your article "NSI announces changes to domain name dispute policy" (Aug. 19,

page 12) gives only Network Solutions, Inc.'s views and fails to provide the views of any domain name owners, who are the primary victims of the policy. I wish you had interviewed even one of the domain name owners that had to sue NSI to keep from losing their domain names under the poorly designed policy. The NSI policy places all of its domain name owners at perpetual risk of nearly instant loss of their domain names, even if they aren't infringing on any trademarks. NSI should return to the policy used by nearly all other domain name registries, namely the policy set forth in RFC 1591.

*Carl Oppedahl  
Partner  
Oppedahl & Larson  
Yorktown Heights, N.Y.*

### Acro-batty

Please stop with all the acronyms. In your story "Cisco backs up ATM LANE" (Aug. 19, page 7) — a two-column article taking up about one-quarter of a page — I counted no less than 12 acronyms.

At the rate this industry is going, in two years a whole article will consist of a couple of paragraphs of acronyms sprinkled with a few participles and verbs. No wonder people think we're speaking Greek.

*Daniel Duffy  
Network systems engineer  
Fresno County Office of Education  
Fresno, Calif.*

## NetworkWorld

Editor in Chief  
John Gallant

Editor  
John Oix

### NEWS

News Editor  
Doug Barney

Associate News Editor  
Bob Brown

Enterprise Editor  
Charles Bruno

Phone: (407) 381-7801; Fax: (407) 381-7903

### NETWORK WORLD FUSION

Adam Gaffin - Online Editor  
Phone: (508) 820-7433; Fax: (508) 820-3467

Chris Nerney - Online Senior Writer  
Phone: (508) 820-7451; Fax: (508) 820-3467

### WANS & INTERNETWORKING

Michael Cooney - Senior Editor  
Phone: (703) 830-8138; Fax: (703) 830-7963

Jim Duffy - Senior Editor  
Phone: (508) 820-7525; Fax: (508) 820-3467

Tim Greene - Senior Writer  
Phone: (508) 820-7422; Fax: (508) 820-3467

### CARRIER SERVICES

Joanie Wexler - Senior Editor  
Phone: (415) 938-0670; Fax: (415) 938-0676

David Rohde - Sr. Washington Correspondent  
Phone: (202) 879-6758; Fax: (202) 347-2365

### LOCAL NETWORKS

Christine Burns - Senior Writer  
Phone: (508) 820-7456; Fax: (508) 820-3467

Jodi Cohen - Senior Writer  
Phone: (508) 820-7449; Fax: (508) 820-3467

John Robinson - Staff Writer  
Phone: (508) 820-7418; Fax: (508) 820-3467

### CLIENT/SERVER APPLICATIONS

Barb Cole - Senior Editor  
Phone: (619) 728-8858; Fax: (619) 728-8886

John Cox - Senior Editor  
Phone: (508) 834-0554; Fax: (508) 834-0558

### INTRANETS & THE 'NET

Ellen Messmer - Sr. Washington Correspondent  
Phone: (202) 879-6752; Fax: (202) 347-2365

Carol Sliwa - Senior Writer  
Phone: (508) 820-7427; Fax: (508) 820-3467

### INTRANET MAGAZINE

Beth Schultz - Executive Editor  
Phone: (312) 283-0213; Fax: (312) 283-0214

Peggy Watt - Senior Editor  
Phone: (415) 903-9519; Fax: (415) 968-3459

### Managing Editor

Michelle Psychogeos

### COPY DESK/LAYOUT

Clare Mansfield - Assistant Managing Editor  
Sandra Gittlen - Copy Editor

Wendy Hodgson - Layout Editor  
Lori Montemurro - Layout Editor

### ART

Rob Stave - Design Director  
Thomas Norton - Associate Art Director

Allyson Nickowitz - Senior Designer  
John Fischer - Graphic Designer

Pauline Chouinard - Graphics Coordinator

### FEATURES

#### Features Editor

Paul Desmond

Phone: (508) 820-7419; Fax: (508) 820-1103

Jim Brown - Managing Editor, Features  
Phone: (508) 820-7408; Fax: (508) 820-1103

Susan Collins - Associate Features Editor  
Phone: (508) 820-7413; Fax: (508) 820-1103

Kathy Scott - Assistant Features Editor  
Phone: (508) 820-7489; Fax: (508) 820-1103

#### Reviews

Lee Schlesinger - Test Center Director  
Phone: (508) 820-7416

William Rinko-Gay - Director, Network World/PC World  
Server Test Center

Phone: (713) 376-8771; Fax: (713) 251-7857;  
E-mail: bill\_rinko-gay@pcworld.com

#### Test Alliance Partners

Todd Coopee, Trinity College; James Gaskin, Gaskin Computer Services; Steven Goldberg, +G Systems; John Ketchersid III, Latsu, Inc.; Bob Larribeau, Larribeau Associates; Howard and Kristin Marks, Networks Are Our Lives; Edwin Mier, Mier Communications, Inc.; National Computer Security Association; David Rorabaugh, Venture Computer Services; Joel Snyder, Opus One

#### Contributing Editors

Oaniel Briere, Oavid J. Buerger, Mark Gibbs, James Kobielus, Edwin Mier, Mark Miller, Alan Pearce

#### Buyer's Guide Contributors

Tony Croes, Linda Musthaler, Currid & Co.; Mark Miller, OigNet Corp.; James Kobielus, LCC, Inc.; Edwin Mier, Mier Communications, Inc.; Oaniel Briere, Melodie Reagan, Christine Heckart, Liza Henderson, Beth Gage, TeleChoice, Inc.

#### Teletoons

Phil Frank, Joe Troise

#### Assistant to the Editor

Ceryl Crivello

#### Editorial Assistant

Glenna Fasold

#### Colin Ungaro - President/CEO

Evilee Thibault - Senior Vice President/ Publisher  
Mary Fanning - V. P. Finance & Operations

Mary Kaye Newton - Assistant to the President

#### Board of Directors

Colin Ungaro, Pat McGovern, Bob Metcalfe, Joe Levy, Kelly Conlin



## Is ADSL the optimum solution for high-speed Internet access?

**A**

symmetric Digital Subscriber Line (ADSL) technology is the optimum solution for high-speed Internet access because of its strengths in several key areas.

First and foremost, ADSL provides near-universal access to prospective Internet users. ADSL-based services use existing copper subscriber lines, which provide telephone service to the majority of the world's population. The planet is laced with approximately 640 million such lines — virtually all of which can support ADSL transmission — and their prevalence is unmatched by any other type of access network.

Another factor that makes ADSL the best solution for Internet access is that existing home telephone wiring is well suited for ADSL-based service. A large percentage of personal computers already use telephone lines for modem access. This same telephone line is all that is required to connect an ADSL modem to the network. With ADSL, there is virtually no need for in-home rewiring.

A third ADSL strength is its transmission capacity. The inherent capability of ADSL discrete multitone (DMT) line-code technology to automatically, optimally and independently adapt its transmission speed to each of the 640 million copper lines enables ADSL service providers to offer data rates between 1.5M and 8M bit/sec downstream from the network and between 176K and 1M bit/sec upstream.

For the vast majority of users, actual performance will fall within this range, depending on the length and quality of individual telephone lines. To Internet users, this means an increase in speed of about 50 to 300 times the typical 28.8K bit/sec modem connection.

Data privacy is another key advantage of ADSL technology. Security has become quite a concern for Internet users because they want to be sure their E-mail and Internet downloads cannot be viewed by others. Because ADSL transmissions use existing phone lines, there is a unique, point-to-point connection between each customer and the network. As a result, customers can't see one another's data, either accidentally or intentionally. Deliberate ADSL wiretaps, while not impossible, would be extremely difficult due to the complex nature of the ADSL signals on the telephone line.



**Dave Bush**

In addition, because each connection is point to point, the quality of service for ADSL-based access networks is constant for each user. Therefore, ADSL service will never degrade because of the number of active users or the amount of traffic on the access network. Of course, data traffic elsewhere on the network could cause a degradation of service, but it wouldn't be in the ADSL portion of the network.

ATM is an important emerging technology for multiplexing all types of data traffic over a common communications channel. ADSL-based networks are well suited for carrying ATM traffic, thus future-proofing ADSL technology for decades to come.

International standards for ADSL equipment have been ratified by both the ANSI and the European Telecommunications Standards Institute. These standards, which call for DMT line-code technology, will help ensure interoperability between DMT-based ADSL equipment from various vendors. This means that the ADSL modem you purchase in Birmingham, Ala., will still allow you access to the Internet when you travel to Los Angeles on business. This is not the case with technologies lacking interoperability-enabling standards. ADSL is a powerful technology that permits the full potential of everyday telephone lines to be realized for vastly improved Internet access. Imagine surfing a World-Wide Web where high-quality video clips play at the click of a mouse, huge files download in seconds rather than tens of minutes, and browsers no longer need to display download progress. Using ADSL technology for Internet access will make these situations the norm, rather than simply an end user's dream.

*Bush is a systems and applications engineering manager with Motorola Semiconductor's MOS Digital-Analog IC Division in Austin, Texas, producer of ADSL transceivers. He can be reached via the Internet at [rlju70@email.sps.mot.com](mailto:rlju70@email.sps.mot.com).*

**For more on ADSL, see the feature story on page 119.**

**B**

usinesses, telecommuters and users of the World-Wide Web are all aware of the need for speed. Cable modems and wireless cable modems are emerging as leading technologies for eliminating the bottleneck caused by today's telephone modems.

Cable modems transmit data over the cable television system instead of the telephone system; wireless cable modems use microwave broadcasts to connect users' computers to the Internet. Both types of transmission can be controlled by the same equipment at the cable TV operator's central office.

Compared with Asymmetric Digital Subscriber Line (ADSL) solutions, cable modems offer substantial advantages in terms of technology and business strategies.

First, cable modems are faster than ADSL solutions: ADSL rates range from 1.5M to 8M bit/sec, while cable modems deliver data at 10M to 30M bit/sec. By delivering Internet photos, video and other graphic information at full Ethernet speed, cable modems can eliminate the world-wide wait users now endure.



**Ed Moura**

Second, cable modems are more cost-effective than ADSL solutions. Today, according to our estimations, ADSL data terminal equipment costs between \$2,000 and \$5,000 per user, plus the cost of shared equipment at the central office. In an office, each user must have an ADSL connection, and you need one device at each end of the connection.

Compare that to a cable modem that can serve an entire office LAN for about \$1,000. Central-site equipment for cable modems adds another \$100 to the cost per site in commercial installations. This cost differential is expected to remain even when technological advances such as new chipsets and quantity manufacturing reduce the costs for both ADSL and cable solutions.

Third, unlike ADSL solutions, cable modems are not limited by location. ADSL faces a technical and business problem today because it works only within 3.5 miles of the switching office. If carriers have to install digital repeaters in the local loop to provide users with ADSL service, costs will rise substantially. Furthermore, if a carrier has already installed loading coils in the local loop to enable voice to transmit successfully over longer distances, the plant is unable to carry ADSL transmissions without very expensive modifications.

Cable modems work on installed cable TV networks, which often serve remote and dispersed customers. In locations such as commercial districts and office parks, where many customers are not served by cable, wireless cable delivery is a cost-effective option for high-speed Internet access.

Fourth, there are business drivers behind cable modems. They offer new sources of revenue to cable TV operators serving households and open up the business market to development. Wireless operators expect to find valuable commercial opportunities for the wireless spectrum they control. ISPs looking to extend their services will be able to focus on providing the profitable business and professional market with value-added Internet offerings. By contrast, ADSL technology has the potential to make obsolete ISDN and T-1/T-3 transmission equipment already installed in the field. If the telephone companies charge lower rates for ADSL services, they will cannibalize their installed base of existing ISDN and T-1 leased-line businesses. This threat could delay widespread ADSL implementation.

Finally, cable systems can be more easily upgraded than ADSL systems. Cable TV operators, which currently use the phone system to provide upstream data links, are building hybrid fiber-coaxial networks that will support two-way cable transmission. Wireless cable operators also expect to support two-way transmission soon.

With ADSL, telephone carriers do not have a clear upgrade path. Fiber-to-the-curb upgrades are not directly compatible with an ADSL strategy.

Cable and wireless cable operators are in the best position to meet users' needs for high-speed Internet access with flexible configurations supporting offices and telecommuters. Cable and wireless cable can deliver Internet access now at competitive prices and, just as important, support a clear migration path to new technologies.

*Moura is vice president of network systems for Hybrid Networks, Inc., a cable modem vendor in Cupertino, Calif. He can be reached via the Internet at [ejm@hybrid.com](mailto:ejm@hybrid.com).*





## *The Synchrony™ Collection by Ascom Timeplex. All originals. No copies.*

**From TDM to Frame Relay to ATM.** The Ascom Timeplex SYNCHRONY family of products can transform your worst networking nightmare into an integrated masterpiece. (And you don't have to be Rembrandt to do it.)

Could this be a portrait of your networking needs?:

- Lower costs, more bandwidth.
- An easily managed network that supports voice, video, LAN and legacy—especially those applications at branch and remote sites.
- A systems approach that recognizes the value and business-critical nature of your network.
- A migration strategy that paints a clear, precise picture of your future network transition.
- Solutions that make life easier, and

-Weekends free from that pesky pager!

Welcome to the SYNCHRONY collection, your palette to create a brilliant network featuring multiservice switches and access devices.

With the SYNCHRONY family you get efficient use of bandwidth—and that saves you money. YOU are in control and can support additional bandwidth demand, and multiple traffic types—voice, video, LAN and legacy, as required. Your ability to blend and balance the remote, private and public elements of the network is enhanced by the system's superb flexibility. SYNCHRONY. All the colors you'll ever need for your network masterpiece, today and tomorrow.

At Ascom Timeplex we've perfected the art of communication. Be the master of YOUR network, call today.

400 Chestnut Ridge Road/Woodcliff Lake NJ 07675/tel: 800-669-2298/Fax: 201-573-6470/http://www.timeplex.com. Synchrony and ascom Timeplex are trademarks of Ascom Timeplex Trading AG. Shown is the first in a series of fine art commissioned by Ascom Timeplex to reflect our commitment to communication as art.

*Masters of Networking:* **ascom Timeplex**



# Buyer's Guide





# It's arrived

*With the palette now full of products, you can start painting your ATM masterpiece.*

By Edwin Mier

**C**an you picture everything on your network running over ATM? If you're experienced mainly in voice communications or packet-based data networking, you may have trouble conjure up that vision. But you are becoming a minority.

With ATM prices plummeting and the ATM technology becoming better understood, it's clear that the technology has progressed from promise to practicality. Mier Communications, Inc. estimates the total number of installed ATM connections more than doubled in the first half of this year to more than 250,000. And the way things are going, it could double again by year-end.

But, wait a minute. Does this mean all the ATM standards issues have been worked out? Absolutely not. Is ATM now a completely mature and risk-free technology? No, but it's getting there. Can ATM fully integrate all of your organization's traffic within a single, unified network today? Not quite; not yet.

If you ask instead whether ATM is selling, whether it offers unique advantages and whether you can readily get all the pieces you need to deploy ATM today, the answer is a resounding yes.

This Buyer's Guide is a testament to the proliferation and availability of ATM equipment. The chart on page 92, for example, profiles 38 ATM switches that come in all shapes and sizes from 28 ven-

dors. ATM adapters from 16 vendors that support all popular workstation and server platforms are listed in the chart on page 100. Then there's a listing of products from more than a dozen vendors that offer you ways to interconnect existing LANs over an ATM backbone in the chart on page 96.

A sign that ATM is maturing – let's say passing from childhood to adolescence – is that the marketplace is segmenting itself along lines that reflect different user environments. The two most notable ones are:

■ Carriers and service providers, who are using ATM now largely for high-speed internal backbones. Several key ATM features appeal to this user class including ATM's inherent cell-multiplexing; the high speed, redundancy and reliability of ATM's underlying synchronous, fiber-based digital transport; and the fast and flexible provisioning and reconfiguration of channels that ATM permanent virtual circuits (PVC) provide.

■ End users, who are implementing ATM in high-speed workgroup data networks and in campus backbones. Use of switched virtual circuits (SVC) in these networks is mushrooming. SVCs, combined with ATM's varied classes of ser-

vices, provide switched-bandwidth allocation on demand for the widely differing traffic types of end users.

## Central switching

The common denominator to any ATM network, whether it be a nationwide carrier backbone or a workgroup, is the switch. The ATM switches listed in the Buyer's Guide chart on page 92 have very different configurations, capacities, interfaces – and price tags.

Workgroup ATM switches are designed to interconnect workstations in a high-speed cluster. These usually support an uplink for connecting the cluster to an ATM backbone. Some workgroup switches can also, or alternately, be used to link an ATM workgroup with one or more legacy LANs.

There are a few factors to bear in mind when evaluating workgroup ATM switches. First, the switch configuration needs to satisfy your requirements. Are

enough ports supported for your current environment? Is there flexibility to grow? Are you planning for all 155M bit/sec connections? (They are by far the most prevalent choice today, although low-cost 25M bit/sec ATM adapters are also available.) Will

## ON THE PRICE SLIDE

**You can get 155M bit/sec workstation ATM adapters for less than \$1,000 today. On the switch side, a 155M bit/sec ATM port can cost from \$2,500 to \$25,000, depending on the type and class of switch. While these prices will seem high, and may in fact still keep ATM affordability out of your reach, they reflect a 40% to 50% drop from a year ago.**

ILLUSTRATION BY BEN FARR



## ATM switches

Vendor	Product	Type				Configuration				Max. number of ports per interface type (1)						Traffic types and signaling						Management	Price				
		ATM workgroup only	ATM and LAN workgroup	ATM edge switch	Private ATM backbone	Carrier ATM backbone	Fixed configuration	Modular multistack chassis	Modular multistack system	Hot-swappable ATM modules	Redundancy features	T-1	25M bit/sec	T-3	100M bit/sec TAXI	155M bit/sec OC-3	622M bit/sec OC-12	Constant bit rate (CBR)	Variable bit rate (VBR)	Available bit rate (ABR)	Unspecified bit rate (UBR)			Switched virtual circuit	UNI 3.0 or 3.1	PNNI	
ADC Kentrox (503) 643-1681	AAC-3 ATM Access Concentrator			✓			✓	✓	✓	✓	28		7		7			✓	✓		✓				SNMP, telnet, TFTP	From \$20,000 for typical configurations	
ADC Telecommunications Network Services (800) 366-3891	Cellworx AMS 5001					✓	✓		✓	✓	60		30		15			✓	✓		✓		✓		SNMP (2)	From \$33,476; \$82,000 for basic system with full management	
Agile Networks, Inc. (508) 263-3600	ATMizer 125		✓		✓		✓		✓	✓					5						✓	✓	✓		SNMP, TFTP	\$30,300 for base chassis; \$2,500 per OC-3 interface	
Alcatel Telecom (972) 996-5000	1000 AX	✓		✓	✓	✓	✓		✓	✓	6,944		1,736		1,736	1,736		✓	✓	✓	✓	✓	✓	✓	CMIP (2)	Vendor will provide pricing for specific configurations only	
Ascom Timeplex, Inc. (201) 391-1111	DS-2010				✓	✓		✓	✓	✓					4			✓					✓		Not specified	Vendor will provide pricing for specific configurations only	
Cabletron Systems, Inc. (603) 337-9400	9A000, SFCS 200BX and SFCS 1000					✓	✓	✓	✓	✓			24 or 96	24 or 96	24 or 96	24 or 96		✓			✓	✓	✓	✓	BOOTP, SNMP, TFTP	From \$17,225-\$32,250 for base systems	
Cascade Communications Corp. (503) 692-2600	500 ATM Switch			✓	✓	✓	✓		✓	✓			112		56	14		✓	✓	✓	✓	✓	✓	✓	SNMP, telnet, TFTP	From \$25,000 for base system	
Cisco Systems, Inc. (800) 859-2726	Lightstream 1010	✓		✓	✓	✓	✓		✓	✓			16		32	8		✓	✓	✓	✓	✓	✓	✓	SNMP, telnet, TFTP	From \$19,000 for base chassis; from \$2,100 for OC-3 interface	
	StrataCom IGX			✓			✓		✓	✓	240		23		6			✓	✓	✓	✓		✓		SNMP	From \$35,000 for base system	
	StrataCom BPX			✓	✓	✓	✓	✓	✓	✓	7,680 (3)		144		96	24		✓	✓	✓	✓	✓	✓	✓	SNMP	From \$27,500 for base system	
Connectware, Inc. (214) 907-1093	CELLerity 6120-212 and 6135-312		✓				✓			✓					68			✓		✓	✓	✓	✓		BOOTP, SNMP (4), telnet, TFTP,	From \$9,600 or \$11,900 for base system; from \$8,500 for OC-3 interface	
	CELLerity 6140-416		✓				✓			✓		68							✓	✓	✓	✓	✓		BOOTP, SNMP (4), telnet, TFTP,	From \$8,800 for base system	
CrossComm Corp. (508) 481-4060	XLX ATM Switch	✓	✓	✓	✓		✓	✓		✓			32		32			✓	✓	✓	✓	✓	✓		SNMP	From \$19,995 for base system	
Digital Equipment Corp. (800) 457-8211	GIGAswitch/ATM System	✓			✓		✓			✓	52		52		52	13			✓	✓	✓	✓	✓	✓	BOOTP, SNMP (4), telnet, TFTP	\$5,250 for 5 slots; \$15,240 for 14 slots; from \$5,700 for ATM interface	
First Virtual Corp. (408) 567-7200	V-Switch		✓				✓				20				2				✓		✓	✓	✓		SNMP (4)	From \$5,700 for base system	
Fore Systems, Inc. (888) 404-0444	ForeRunner ASX-200WG	✓					✓			✓		24			24	16	16		✓	✓	✓	✓	✓	✓	✓	SNMP, telnet	\$9,995 for base system
	ForeRunner ASX-200BX and ASX-1000	✓		✓	✓		✓		✓	✓	24	24	16	24	16	4			✓	✓	✓	✓	✓	✓	✓	SNMP	From \$15,950 for base system
General DataComm, Inc. (203) 574-1118	GDC Apex ATM switches			✓	✓	✓	✓		✓	✓	30			30	30			✓	✓		✓	✓	✓	✓	✓	SNMP, telnet, TFTP	From \$6,000 for base system
Hitachi Telecom USA, Inc. (770) 446-8820	AMS 5001					✓	✓		✓	✓	60		30		15			✓	✓		✓		✓		SNMP (2)	From \$33,476; \$82,000 for basic system with full management	
Hughes Network Systems, Inc. (301) 601-4299	BX5000			✓	✓		✓		✓	✓			16		16			✓			✓		✓		SNMP	From \$26,300 for base system	
IBM (800) 426-2255	8260 Switching Hub		✓	✓	✓	✓	✓		✓	✓		168	28	56	28			✓	✓	✓	✓	✓	✓	✓	SNMP, telnet, TFTP	From \$21,585 for base system	
	8285 Nways Switch	✓	✓	✓			✓		✓			48	6	12	7			✓	✓	✓	✓	✓	✓	✓	SNMP, telnet, TFTP	From \$6,995 for base system	
Lucent Technologies, Inc. (888) 458-2368	GlobeView-2000 Broadband System					✓		✓	✓	✓			384		128			✓	✓	✓	✓	✓	✓		CMIP, SNMP (2),telnet	Vendor will provide pricing for specific configurations only	
Madge Networks, Inc. (800) 876-2343	Collage 740 Backbone Switch				✓		✓		✓	✓					16			✓	✓	✓	✓	✓	✓	✓	SNMP, telnet, TFTP	From \$13,495 for base system	
	Collage 250 and 280	✓	✓				✓			✓					12			✓	✓		✓	✓	✓	✓	SNMP (4)	From \$6,995 for base system	
NEC America, Inc. (214) 518-5000	Atomnet/M7			✓	✓		✓		✓	✓	62		32	62	62	16		✓	✓		✓	✓	✓	✓	SNMP, telnet	Vendor will provide pricing for specific configurations only	
Newbridge Networks, Inc. (800) 343-3600	36170 MainStreet				✓	✓	✓	✓	✓	✓			180		180			✓	✓	✓	✓	✓	✓	✓	CMIP, SNMP (4), telnet	Less than \$30,000 for base system	
	Vivid ATM Workgroup Switch	✓			✓		✓								12			✓	✓	✓	✓	✓	✓	✓	SNMP, telnet	\$23,700	
Northern Telecom, Inc. (800) 466-7835	Magellan Passport			✓	✓		✓		✓	✓	42		18		6			✓	✓		✓		✓	✓	SNMP, telnet	\$50,000 for typical system with voice, video, frame relay and ATM	
	Magellan Concorde					✓	✓		✓	✓			64		64	16		✓	✓	✓	✓		✓	✓	SNMP (4)	Vendor will provide pricing for specific configurations only	
	Magellan Vector			✓	✓			✓	✓	✓	48		32		32	8		✓	✓	✓	✓	✓	✓	✓	SNMP	Vendor will provide pricing for specific configurations only	
Scorpio Communications (212) 221-5998	Stinger 1 and Stinger 5				✓		✓		✓	✓		24 or 96	8 or 32		8 or 32			✓	✓	✓	✓	✓	✓	✓	BOOTP, SNMP, TFTP	From \$15,800 for base system	
3Com Corp. (800) 638-3266	ONcore			✓	✓		✓		✓	✓		168		56	8			✓	✓	✓	✓	✓	✓	✓	SNMP (4), telnet	From \$26,990 for base system	
Telematics International, Inc. (800) 833-4580	NCX 1E6			✓	✓		✓		✓	✓	40		16		16			✓	✓		✓	✓	✓	✓	SNMP (4), TFTP	From \$60,000 for base system	
Thomson-CSF Enterprise Networks (408) 452-0555	ThomFlex 5100			✓	✓		✓		✓	✓	16	96	16		60			✓	✓	✓	✓	✓	✓	✓	BOOTP, SNMP (4),TFTP	From \$16,950 for base system	
UB Networks, Inc. (800) 777-4526	GeoSwitch/25	✓					✓					48						✓	✓		✓	✓	✓		SNMP, telnet	From \$6,995 for base system with 12 interfaces	
	GeoSwitch/155		✓				✓								4			✓	✓	✓	✓	✓	✓		SNMP, telnet	From \$8,999 for base system	
Whitetree, Inc. (415) 855-0855	WS2500 Workgroup Switch	✓					✓		✓						2			✓	✓		✓	✓	✓	✓	SNMP (4)	From \$6,995 for base system	

Product names highlighted in color: were selected for the Short List.

Chart compiled by Mier Communication

### Footnotes:

(1) When fully configured for specified interface type only.  
Mixing interface types lowers the maximum number.

(2) Out of-band only.

(3) Via external concentrators.

(4) In-band only.

CMIP: Common Management Information Protocol

PNNI: Private Network-to-Network Interface

TAXI: Transparent Asynchronous Transmitter/Receiver Interface

TFTP: Trivial File Transfer Protocol

UNI: User-Network Interface



See us at  
Networld + Interop 96  
Booth #510

# What if you could invest in technology without freezing yourself in time

At the rate technology advances, too often the instant you make a purchase, it's obsolete.

For WAN solutions, this can mean choosing between a frame relay platform for where you are, or an ATM platform for where you want to be. The Alcatel 1100 HSS™ multiservice switch from Alcatel Data Networks lets you avoid this trap by handling ATM or frame relay— or both— in one flexible platform. With plug-in boards that make it not just a timely answer to today's rapidly changing network needs, but an excellent investment for the future. To learn more, call **1-888-ADN-2500** or (703)724-2878, or visit <http://www.adn.alcatel.com>.



WE HELP YOU GROW







# How to grow your Fast Ethernet network any way you want it.

## Introducing Fast Ethernet workgroups from SMC.

Your network is growing.  
Your problems are, too.  
And Fast Ethernet is  
your best way out of  
the woods.

But with needs that  
are rising and a budget  
that isn't, how can you  
add Fast Ethernet?

SMC Fast Ethernet solutions  
let you integrate 100 Mbps  
technology where you need  
it now, and add nodes, band-  
width, and management when  
you need it later.

Start with EtherPower 10/100™  
network cards and  
EZ Switch™ Plus to deliver  
10 Mbps to each workstation,  
and create 100 Mbps  
trunks for your servers.

For power-hungry  
users, build Fast Ethernet  
workgroups with the  
EZ Hub™ 100, at a  
surprisingly low price  
per port.



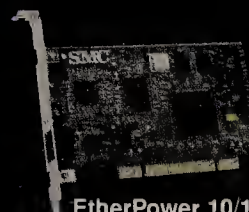
When it's time to  
branch out, add the  
SMC TigerStack™100.  
These Fast Ethernet  
stackable hubs deliver  
unmatched seg-  
mentability, and run on  
Cat 3, Cat 4, Cat 5, or  
fiber. So you can upgrade to  
Fast Ethernet—without uproot-  
ing your infrastructure.

Best of all, SMC Fast  
Ethernet products come with  
our Customer Satisfaction  
Guarantee. It lets you leap into  
Fast Ethernet—without hedging  
your bets.

For more information on  
SMC 100 Mbps solutions, visit  
our Fast Ethernet  
Integration Center at  
[www.smc.com/fe](http://www.smc.com/fe).

Or, call 1-800-SMC-4-YOU.

Because we make  
Fast Ethernet very easy  
to get into. And nearly  
impossible to outgrow.



**EtherPower 10/100**  
Fast Ethernet  
Network Card



**EZ Switch Plus**  
Six 10 Mbps/  
Two 100 Mbps Ports



**TigerStack 100**  
SwitchReady Fast Ethernet  
Stackable Hubs

# SMC®

## Connect With Us.

For information on SMC products  
call 1-800-SMC-4-YOU, Dept. TP06

<http://www.smc.com>

©Copyright 1996 Standard Microsystems Corporation  
Windows NT is a registered trademark of the Microsoft Corporation

Circle Reader Service #85



## Legacy LAN-to-ATM switches

Vendor	Product	Max. number of ports per LAN interface type (1)				Configuration				ATM interfaces				LAN-over-ATM features					Management	Price
		Ethernet	Token ring	FDDI/CDDI	100Base-T	Fixed configuration	Modular multislotted chassis	Copper and fiber wiring	Hot-swappable modules	Redundancy features	T-1 25M bit/sec ATM	T-3 100M bit/sec TAXI	155M bit/sec OC-3	Max. number of ATM interfaces	PVCs SVCs per UNI 3.0	SVCs per UNI 3.1	LANE client	LANE server		
Agile Networks, Inc. (508) 263-3600	ATMizer 121	12			2	✓	✓	✓	✓				✓	2	✓	✓	✓	✓	SNMP, TFTP	From \$16,300 for base system
Alcatel Data Networks (703) 724-2000	1100 LSS Series	108	54	FDDI: 36 CDDI: 72	72	✓	(2)	✓	✓		✓		✓	18	✓	(3)	(3)	✓	FTP, SNMP (4)	\$7,450 for 12 Ethernet ports; from \$9,095 for multislotted system
Allied Telesyn International (206) 487-8880	AT-4016TR, AT-4016F and AT-TS95	8 or 16				✓		✓					✓	1	✓	✓	✓		SNMP, TFTP	\$12,320 to \$18,000 for base system
Bay Networks, Inc. (600) 776-6895	Centillion 100	88	24		10	✓		✓	✓				✓	24	✓	✓	✓	✓	BOOTP, SNMP, TFTP	From \$1,995 for base system; \$6,495 to \$8,995 per module
	System 5000	176			20	✓	✓	✓	✓				✓	48	✓	✓	✓	✓	BOOTP, SNMP, TFTP	From \$6,995 for base system; \$7,995 to \$10,995 per module
Cabletron Systems, Inc. (603) 337-9400	MMAC-Plus Enterprise	468	26	39	156	✓	✓	✓	✓		✓	✓	✓	26	✓	✓	✓	✓	BOOTP, SNMP, TFTP	From \$23,000 for base system; \$9,000 to \$30,000 per module
	WorkGroup SmartSwitch	48		4	24	✓	✓	✓	✓		✓	✓	✓	4	✓	✓	✓	✓	BOOTP, SNMP, TFTP	From \$35,185 for base system; \$6,000 to \$17,000 per module
Cisco Systems, Inc. (800) 859-2726	Catalyst 5000	192		4	4	✓	✓	✓	✓				✓	3	✓	✓	✓	✓	Network download, SNMP	From \$11,995 for base system; \$4,795 to \$19,995 per module
Connectware, Inc. (214) 907-1093	CELLerity Series ATM/LAN Bridge and Bridge/Router	4				✓				✓		✓	✓	1		✓	✓		Network download, SNMP (5);	\$5,495 for bridge; \$5,995 for bridge/router
CrossComm Corp. (508) 481-4060	ATM Edge Switch	24			2	✓	✓	✓	✓		✓		✓	1	✓	✓	✓	✓	Network download, SNMP	\$20,995 for fixed-configuration model; from \$14,995 for base modular system
	XLT/XLT-F ATM Edge Router	32	32			✓	✓	✓	✓		✓		✓	32	✓	✓	✓	✓	BOOTP, SNMP, TFTP	From \$4,495 for base system; \$1,200 to \$19,995 per module
Fore Systems, Inc. (888) 404-0444	ES-3810 Ethernet Switch	74			10	✓	✓			(6)			✓	1		✓		✓	BOOTP, SNMP	From \$3,695 for base system; \$1,795 to \$5,995 per module
Madge Networks, Inc. (408) 955-0700	Collage 530	16				✓							✓	1					SNMP (5)	\$9,995
Newbridge Networks, Inc. (800) 343-3600	VIVID Blue Ridge for Token Ring		10			✓				✓			✓	2			✓	✓	Network download, SNMP	\$14,800
	VIVID Yellow Ridge for Ethernet	12				✓							✓	1			✓		Network download, SNMP	\$10,441
	36150 MainStreet	60	45	FDDI: 15		✓	✓	✓	✓	✓	✓	✓	✓	16	✓				FTP, proprietary CMIP and SNMP	From \$10,000 for base system
3Com Corp. (800) 638-3266	LinkSwitch 2700	12				✓				✓			✓	1	✓	✓	✓	✓	Network download, SNMP	\$8,400
UB Networks, Inc. (800) 777-4526	GeoRim/E	12				✓	✓	✓					✓	1	✓	✓	✓	✓	SNMP (5)	From \$6,995 for fixed-configuration model; from \$5,995 for base modular system
Whitetree, Inc. (415) 855-0855	WS3000 Workgroup Switch	144 (7)				✓	✓	✓			4		✓	15	✓	✓	✓	✓	FTP, SNMP (5), TFTP	\$7,995 per stackable device
Xylan Corp. (818) 880-3500	OmniSwitch with OmniCell	128	48	FDDI: 32 CDDI: 64	64	✓	✓	✓	✓		(3)	✓	✓	16 (8)	✓	✓	✓	✓	FTP, SNMP	From \$9,095 for chassis with 5 slots

Chart compiled by Mier Communications

Product names highlighted in color were selected for the Short List.

## Footnotes:

- (1) When fully configured for specified interface type only.  
Mixing interface types lowers the maximum number.  
(2) Limited functionality.  
(3) Ships in fourth quarter.  
(4) Out-of-band only.
- (5) In-band only.  
(6) Ships in third quarter.  
(7) Up to 12 12-port units can be stacked for 144 ports.  
(8) Will increase to 128 in fourth quarter.

CDDI: Copper Distributed Data Interface  
CMIP: Common Management Information Protocol  
FTP: File Transfer Protocol  
LANE: LAN emulation

PVC: Permanent virtual circuit  
SVC: Switched virtual circuit  
TAXI: Transparent Asynchronous Transmitter/Receiver Interface  
TFTP: Trivial File Transfer Protocol  
UNI: User-Network Interface

you use fiber or try running ATM over Category 5 unshielded twisted pair?

You may also need to wade into thorny ATM technical issues and software capabilities if you want to connect LANs and ATM workstations to an ATM workgroup switch. Existing LAN technologies, which are shared-media and broadcast-based, don't dovetail very well with ATM, which is point-to-point and connection-based. So check to see if the workgroup switch you're examining has special mechanisms such as LAN Emulation (LANE) Configuration Server and LANE Client software, which help bridge the gap.

Within private networks, and especially for campus environments, you'll use ATM private-network backbone switches. These are similar to workgroup ATM switches except they're modified to handle significantly more virtual circuits.

In a workgroup of, say, 10 workstations, a workgroup switch might only need to manage a dozen or so concurrent ATM virtual circuits. A backbone switch, with trunks on each interface, might need to handle hundreds or perhaps thousands of virtual circuits.

The configuration you need in a private ATM backbone switch, including the number and type of ATM interfaces, will depend on the role it plays in your design and topology. For instance, if the switch will connect to a public carrier's ATM service, you'll likely need T-1 or T-3 ATM interfaces. Fiber-based 155M bit/sec ATM service access interfaces are still supported on a very limited basis by service providers.

Also find out if the backbone switch will permit attached endstations to set up their own SVCs or whether it can act only as an intermediate node for establishing SVCs. Then find out how fast SVC setups can be processed as well as the maximum concurrent number of SVCs that can be maintained. Determining if the switch supports the specific set of interface specifications you need, such as Versions 3.0 and 3.1 of the ATM Forum's User-Network Interface (UNI), is also important.

The next major category is the ATM access, or edge switch, which is designed to provide the control, cell switching, cell processing and interface between your

## Completing the ATM connection

With so much focus on switches, network interface cards and adapters, and legacy LAN-to-ATM switches, it's easy to lose sight of the fact that you may often need some other piece of equipment to finish building an ATM network. Fret not. There are a host of specialty ATM-based components and subsystems available from a number of vendors.

Here's a sampling of what's offered in the following ATM product categories:

## Interfaces for linking non-ATM devices, networks and systems to, and over, ATM:

- ▶ ATM Interface Processor and ATM Network Processor modules for Cisco Systems, Inc.'s 7000 and 4000 families of multiprotocol routers
- ▶ Computer Network Technology's Channelink ATM product for extending SCSI and IBM mainframe channels over an ATM network
- ▶ FastComm Communications Corp.'s LAN SARGent for bridging Ethernets over an ATM permanent virtual circuit
- ▶ Newbridge Networks, Inc.'s 36030 and 36050 LAN Service Units for bridging Ethernet or token ring over ATM
- ▶ Odetics Telecom's ATM interface and converter modules
- ▶ UB Networks, Inc.'s GeoLink/LA hub cards for bridging Ethernets over ATM

## DSU/CSUs for connecting private ATM networks to public ATM network services:

- ▶ ADC Kentrox DataSmart T-3 ATM DSU
- ▶ Sahara Networks' SA-100 Broadband Service Unit

## ATM network concentrators and multiplexers:

- ▶ ADC Kentrox's AAC-1 ATM Access Concentrator
- ▶ Dynatech Communications, Inc.'s DynaStar series of Access Switches
- ▶ Fujitsu Network Communications, Inc.'s SMX-6200 multiplexer
- ▶ Larscom, Inc.'s IMUX-A45 inverse multiplexer and Orion 4000 Broadband Access Multiplexer
- ▶ Litton-FiberCom's CAM 7640/50 ATM Multiplexer family
- ▶ OnStream Networks, Inc.'s CS600 ATM Access Concentrator
- ▶ Premisys Communications, Inc.'s IMACs ATM Concentrator
- ▶ Sahara Networks, Inc.'s SA series of concentrators and multiplexers

## Other ATM-oriented, specialty products:

- ▶ GTE Network Systems Division's InfoGuard 100 cell encryptor for securing digital traffic over ATM links operating at up to T-3 speed
- ▶ Litton-FiberCom's CAMVision video codec

SOURCE: MIER COMMUNICATIONS, PRINCETON JUNCTION, NJ





# LINK DATA UP TO 2.5 MILES AT THE SPEED OF ATM/FDDI.

## CANOBEAM II

Wireless Optical Beam Communication System




- **Interference Free.**
- **Sets-Up In Minutes.**
- **Auto-Tracking Insures Uninterrupted Operation.**

Canobeam is a sophisticated Optical Beam Communication System that features speed, bi-directional bandwidth and auto-tracking for FDDI/ATM transmission where no optical cable exists.

Canobeam sets-up in minutes, is easy-to-use and operates interference free assuring reliable and confidential transmission at speeds of 125/155.52 Mbps at a distance of up to 2.5 miles. A unique auto-tracking adjustment system insures uninterrupted operation even from the tops of buildings prone to sway and vibration, while a built-in "video camera" feature automatically set-up the bi-directional HS-40B Heads.

The CD-30F control unit, which is connected by a coaxial cable, provides control and monitoring from any location, within 600 feet of the HS-40B beam unit. There's even a built-in flash for set-up at longer distances, night, or in inclement weather.

Transmit FDDI/ATM where no optical cable has gone before... with Canobeam. For more information, please call 1-800-321-4388.



# Canon

Web site @ <http://www.usa.canon.com>

**Canobeam will be in  
operation at Network +  
Interop Atlanta '96  
within the InteropNet.  
Visit Canon booth #4454.**





## Let's do the math:

A Catalyst 5000 with 96 switched Ethernet ports at 10 Mbps equals 960 Mbps of downlink traffic. And with only two 100 Mbps Fast Ethernet uplinks, your bottleneck has been created.

$$\frac{200 \text{ Mbps uplinks to backbone}}{960 \text{ Mbps downlinks to desktop}}$$

uplinks can only handle

**21% of total  
throughput**

To make matters worse, Cisco is selling the Catalyst 5000 as a 50-port Fast Ethernet switch. At 100 Mbps per port, that's 5 Gbps. But the total capacity of the Catalyst's centralized switching engine is only 1.2 Gbps. You're oversubscribed! (We'll let you do the math for Gigabit Ethernet.)

$$\begin{array}{r} 5 \text{ Gbps} \\ - 1.2 \text{ Gbps} \\ \hline 3.8 \text{ Gbps} \end{array}$$

**OVERSUBSCRIBED**

Centralized switching engine is

**bottleneck** and  
**single point  
of failure**



# Sorry Cisco,

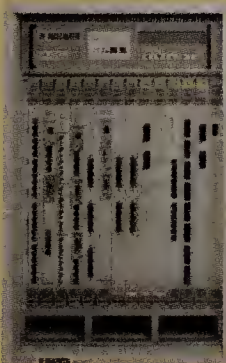
but we *thought* the idea of switching was to *remove* the *bottlenecks*

The Catalyst 5000 may be an okay Ethernet switch. But running traffic from all 96 switched Ethernet ports (960 Mbps) out the two built-in Fast Ethernet uplinks (200 Mbps) creates a significant bottleneck in your network. Then what? Add one of Cisco's 12-port Fast Ethernet uplink modules for 1.2 gigs of raw switching power? Fine, except the total capacity of the Catalyst's centralized controller module is only 1.2 gigs. You're oversubscribed. And to make matters worse, that centralized controller in the Catalyst 5000 is a single point of failure!

Fortunately, there's a more reliable way to eliminate bottlenecks: the fully distributed, fault-tolerant MMAC-Plus from Cabletron Systems. With the MMAC-Plus, every module has its own switching engine and management processor. So the more modules you add, the more bandwidth and throughput you get. All with no single point of failure.

*Now that's the idea of switching...  
eliminate the bottlenecks.*

## The Facts Speak for Themselves



### PERFORMANCE

### CABLETRON'S MMAC-PLUS

### CATALYST 5000

#### Backplane

2.5 Gbps (scalable to > 300 Gbps)

1.2 Gbps (fixed)

#### Aggregate Bandwidth

10 Gbps (scalable to > 75 Gbps)

1.2 Gbps

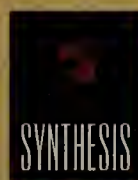
#### Throughput

10.5M pps (scalable to > 100M pps)

1M pps

### Need More Proof? You Got It!

Call (603) 337-0929 for your free "Cabletron Outperforms Cisco" Proof Kit or visit us at Networld+Interop in Atlanta (booths 1012 and 904).



The stuff **intranets** are made of



**CABLETRON**  
SYSTEMS  
The Complete Networking Solution™

Corporate: 35 Industrial Way, Rochester, NH 03867 • Fax: (603) 337-2211 • Internet: <http://www.cabletron.com/>

The Cabletron logo, SmartSwitch, SPECTRUM and Synthesis are trademarks or registered trademarks of Cabletron Systems, Inc. Cisco and Cisco Systems are registered trademarks, and Catalyst is a trademark, of Cisco Systems, Inc.



## ATM NICs and adapters

Vendor	Product	Platform	Interface speed (bit/sec)/cabling requirements	Operating systems						Price
				Windows 95	Windows NT	NetWare 3.X	NetWare 4.X	SunOS and Solaris	Other	
Adaptec, Inc. (408) 945-8600	ANA-5940 and ANA-5930	PCI bus-based PCs	155M/fiber with SC connectors or UTP	✓	✓	✓	✓		MacOS	Fiber: \$595; UTP: \$495
	ANA-5910 EL and DX	PCI bus-based PCs	25M/UTP	✓	✓	✓	✓		MacOS	\$199-\$349
	ANA-5240 and ANA-5230	Sbus-based Sun SPARC workstations	155M/fiber with SC connectors or UTP					✓		Fiber: \$995; UTP: \$895
	ANA 5210	Sbus-based Sun SPARC workstations	25M/UTP					✓		\$349
Cabletron Systems, Inc. (603) 337-9400	NBA-200 series	NuBus-based systems	155M/fiber with SC or ST connectors or UTP						MacOS	\$1,940
	SBA-100 and SBA-200 series	Sbus-based Sun SPARC workstations	100M or 155M/fiber with ST or SC connectors; UTP for 155M model					✓		\$1,075
	GIA-100 and GIA-200 series	GIO bus-based SGI workstations	100M or 155M/fiber with ST or SC connectors; UTP for 155M model						Irix Indigo and Indy workstations	\$1,075
	HPA-200 series	EISA bus-based HP 9000/7xx workstations	100M or 155M/fiber with ST or SC connectors; UTP for 155M model						HP-UX 9.X	\$1,075
	ESA-200 and ESA-200PC series	EISA bus-based PCs or SGI Extreme workstations	100M or 155M/fiber with ST or SC connectors; UTP for 155M model		✓	✓	✓		SGI Irix 5.3	\$1,075
	MCA-200 series	Micro Channel bus-based IBM RS/6000 workstations	100M or 155M/fiber with ST or SC connectors; UTP for 155M model						AIX 3.2.X	\$1,400
	TCA-100	Turbochannel bus-based DEC workstations	100M/fiber with ST connectors						Ultronix	\$1,075
Connectware, Inc. (214) 907-1093	CELLerity ATM 1110 Sbus NIC	Sbus-based Sun SPARC workstations	155M/fiber with SC connectors or UTP					✓		From \$699
	CELLerity ATM 1110 PCI NIC	PCI bus-based PCs with Pentium processor	25M or 155M/UTP for 25M; fiber or UTP for 155M	✓	✓	✓	✓		SCO Unix	From \$495
	CELLerity ATM 1110 EISA NIC	EISA bus-based PCs and HP-UX workstations	25M or 155M/UTP for 25M; fiber or UTP for 155M	✓	✓	✓	✓			From \$595
Digital Equipment Corp. (800) 457-8211	ATMworks 350	PCI bus-based PCs	155M/fiber with SC connectors		✓		✓		Unix	\$1,995
	ATMworks 950L	Sbus-based Sun SPARC workstations	155M/fiber with SC connectors or UTP					✓		Fiber: \$1,395; UTP: \$1,295
	ATMworks 350L	PCI bus-based PCs	155M/fiber with SC connectors or UTP	✓	✓		✓			Fiber: \$1,095; UTP: \$995
	ATMworks 750	Turbochannel bus-based workstations with DEC Alpha processor	155M/fiber with SC connectors						Unix	\$2,495
Efficient Networks, Inc. (214) 991-3884	ENI-155p	PCI bus-based PCs	155M/fiber with SC connectors or UTP	✓	✓	✓	✓			Less than \$1,000 (1)
	ENI-155 series	Sbus-based Sun SPARC workstations	155M/fiber with SC connectors or UTP					✓		Less than \$1,000 (1)
	ENI-100s	Sbus-based Sun SPARC workstations	100M/fiber with SC connectors					✓		Less than \$1,000 (1)
	ENI-155e	EISA bus-based PCs and PowerPCs	155M/fiber with SC connectors or UTP	✓	✓	✓	✓			Less than \$1,000 (1)
	ENI-25p	PCI bus-based PCs with DEC Alpha, Pentium or PowerPC processor	25M/UTP	✓	✓				Windows and NetWare Client32 planned	\$249
	ENI-100e	EISA bus-based PCs and PowerPCs	100M/fiber with SC connectors		✓	✓	✓			Less than \$1,000 (1)
Fore Systems, Inc. (888) 404-0444	HPA-200 series	EISA bus-based HP workstations	155M/fiber with ST or SC connectors or UTP						HP-UX	\$995-\$1,195
	SBA-200 series	Sbus-based Sun SPARC workstations	155M/fiber with ST or SC connectors or UTP					✓		\$995-\$1,195
	GIA-200 series	GIO bus-based SGI workstations	155M/fiber with ST or SC connectors or UTP						Irix	\$995-\$1,195
	ESA-200E and ESA-200EPC series	EISA bus-based PCs and SGI workstations	155M/fiber with ST or SC connectors or UTP		✓	✓	✓		SGI Irix	\$995-\$1,195
	NBA-200 series	NuBus-based systems	155M/fiber with ST or SC connectors or UTP						MacOS	\$995-\$1,195
	MCA-200 series	Micro Channel bus-based IBM RS/6000 workstations	155M/fiber with ST or SC connectors or UTP						AIX	\$1,295-\$1,495
	PCA-200 series	PCI bus-based PCs and Power Macintoshes	155M/fiber with ST or SC connectors or UTP		✓	✓	✓		Apple Open Transport 1.1	\$995-\$1,195
	VMA-200 series	VMEbus-based SGI workstations	155M/fiber with ST or SC connectors or UTP						Irix	\$1,995-\$2,195
Interphase Corp. (214) 654-5000	5515	PCI bus-based PCs	155M/fiber with SC connectors or UTP	✓	✓	✓	✓		MacOS, OS/2, UnixWare, Solaris x86	\$650
	5525	PCI bus-based PCs	25M/UTP	✓	✓	✓	✓		MacOS, OS/2, UnixWare, Solaris x86	\$222
	4615	Sbus-based workstations	155M/fiber with SC connectors or UTP					✓		\$795
	4815	PCI bus-based PCs with Pentium processor	155M/fiber with SC connectors or UTP		✓	✓	✓		HP-UX 9.X and 10.X, Irix	\$895
	5215	VMEbus-based workstations	155M/fiber with SC or ST connectors						Irix, SunOS, HP-RT	\$2,795
	4915	GIO bus-based SGI workstations	155M/fiber with SC connectors or UTP						Irix	\$995
Madge Networks, Inc. (800) 876-2343 Newbridge Networks, Inc. (800) 343-3600	Collage 25 Adapter	PCI bus-based PCs	25M/UTP	✓	✓	✓			OS/2 Warp	\$295
	Collage 155 Adapter	PCI bus-based PCs	155M/fiber with ST connectors or UTP	✓	✓	✓			OS/2 Warp	Fiber: \$1,295; UTP: \$1,195
	VIVID ATM NIC	EISA bus-based PCs, HP 9000 workstations, and SGI Challenge and Indigo2 workstations	155M/fiber with SC connectors			✓	✓		HP-UX, Irix	\$1,267
	VIVID Sbus ATM NIC	Sbus-based Sun SPARC and Ultra workstations	155M/fiber with SC connectors					✓		\$1,267
	VIVID GIO ATM NIC	GIO bus-based SGI Indy and Challenge servers	155M/fiber with SC connectors						Irix 5.X	\$1,267
	VIVID PCI ATM NIC	PCI bus-based PCs, PowerPCs, and DEC AlphaServers	155M/fiber with SC connectors		✓		✓		DEC Unix	\$1,267
Qicom USA, Inc. (214) 423-7560	RapidFire OC-615x	PCI bus-based PCs with Pentium processor	155M/fiber with SC connectors or UTP	✓	✓	✓	✓		OS/2 Warp	Fiber: \$795; UTP: \$695
SDL Communications, Inc. (508) 238-4490	RISCom/TCI card	PCI bus-based PCs with Pentium processor	155M/fiber with SC connectors or UTP (T-1 and T-3 models available)		✓				BSDi, LINUX	From \$1,500
Standard Microsystems Corp. (516) 273-3100	ATM Power155 Sbus series	Sbus-based workstations	155M/fiber with ST connectors or UTP					✓		Fiber: \$1,295-\$1,990 UTP: \$1,149-\$1,880
	ATM Power155 PCI series	PCI bus-based PCs	155M/fiber with ST connectors or UTP	✓	✓	✓	✓			Fiber: \$1,149-\$1,880 UTP: \$995-\$1,750
	ATM Power155 EISA series	EISA bus-based PCs	155M/fiber with ST connectors or UTP	✓	✓	✓	✓			Fiber: \$1,295-\$1,990 UTP: \$1,149-\$1,880
Sun Microsystems, Inc. (415) 960-1300	SunATM	Sbus-based Sun workstations, including Media and Netra	155M or 622M/fiber or UTP for 155M; fiber for 622M						Solaris 2.4 and later	\$995-\$4,995
SysKonnnect, Inc. (408) 437-3800	SK-7321 and SK-7341	EISA bus-based PCs	155M/fiber with SC connectors or UTP		✓	✓	✓			Fiber: \$1,495; UTP: \$1,195
	SK-7521 and SK-7541	PCI bus-based PCs	155M/fiber with SC connectors or UTP		✓	✓	✓			Fiber: \$1,495; UTP: \$1,195
	SK-7621 and SK-7641	Sbus-based Sun SPARCstations	155M/fiber with SC connectors or UTP					✓		Fiber: \$1,295; UTP: \$995
3Com Corp. (800) 638-3266	ATMLink Sbus-155 Fiber	Sbus-based workstations	155M/fiber with SC connectors					✓		\$1,495
	ATMLink PCI-155 Fiber	PCI bus-based PCs Pentium processor	155M/fiber with SC connectors		✓		✓			\$1,495
ZeitNet, Inc. (408) 986-9100	ZN-1211 and ZN-1215	Sbus-based Sun workstations	155M/fiber with ST connectors or UTP					✓		Fiber: \$995; UTP: \$895
	ZN-1221 and ZN-1225	PCI bus-based PCs	155M/fiber with ST connectors or UTP	✓	✓	✓	✓			Fiber: \$1,095; UTP: \$995

Product names highlighted in color were selected for the Short List.

Footnotes:

(1) Price is for OEMs and resellers.

NIC: Network interface card

SGI: Silicon Graphics, Inc.

UTP: Unshielded twisted pair

Chart compiled by Mlar Communications



Enhanced SNA  
100%  
Guaranteed  
Session Uptime

# "Do you have any idea how fast your SNA was traveling?"



## *SNA Network Users Receive 30% Savings, Faster Data Transfer and 100% Guaranteed Session Uptime With Intermedia/EMI Frame Relay*

It takes an expert in frame relay to create a turnkey solution for a legacy protocol like SNA. It takes Intermedia/EMI. Now, with **Enhanced SNA**, users can extend their network lifespan and carry mission-critical data with 100% guaranteed session uptime (or we'll pay you back double the charge). Courtesy of the first SNA over frame relay package that offers everything you need, from host to remote – generating up to 30% savings with no capital outlay.

Intermedia/EMI has specifically enhanced its network to handle SNA over frame relay. Giving SNA a higher priority,



INTERMEDIA  
COMMUNICATIONS INC./  
EMI COMMUNICATIONS  
CORPORATION  
NASDAQ: ICIX

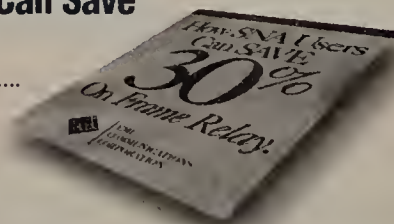
plus bundling together the most efficient CPEs for your specific application. At Intermedia/EMI, we're dedicated

to a single goal: exceeding our customer's expectations. So you can count on a level of service and technological superiority that gives your business a competitive edge. With **Enhanced SNA**, you'll start out with 30% savings by switching to frame relay. You'll end up with an enhanced system with longer network life and 100% SNA session uptime. That's guaranteed. Only from Intermedia/EMI.

**For Your Free "How SNA Users Can Save  
30% on Frame Relay" Guide**

**Call 1-800-456-2001  
or info@emi.com**

Circle Reader Service #80



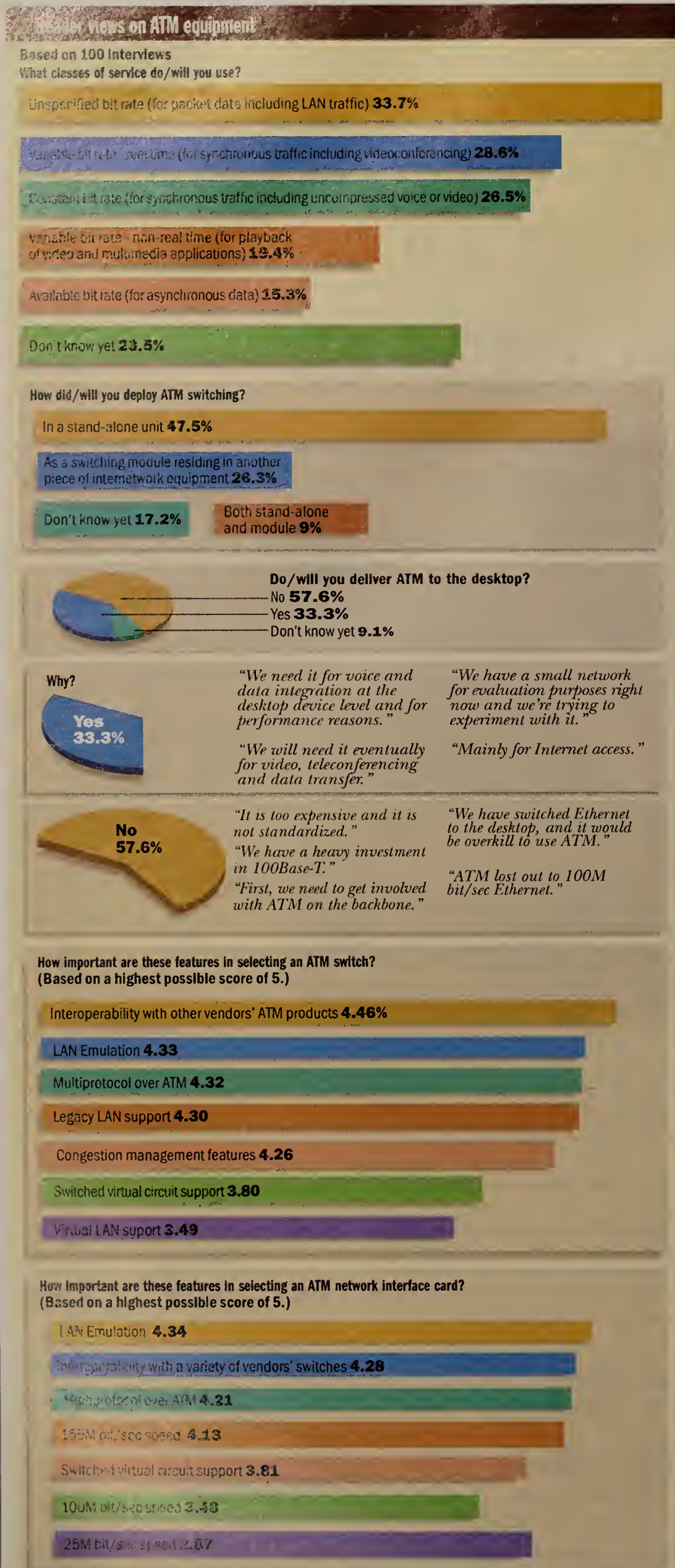
COMMITTED TO BUILDING YOUR INFORMATION LIFELINE <sup>SM</sup>

Frame  
Relay  
Forum

UniSPAN







site and a carrier's ATM service. Edge switches usually support T-1 and T-3 ATM interfaces.

Some ATM edge switches speak ATM only in the direction of the carrier network. Users in this case deliver traffic to the switch via conventional, non-ATM interfaces, such as a V.35 port or LAN interface, and the switch converts that traffic to ATM for transmission to the carrier network. Others, however, can accept user ATM inputs as well as converse with the carrier's network via ATM.

Due to the still-fluid nature of many ATM interface specifications, compatibility between an edge switch and a particular carrier's ATM network is hardly guaranteed. PVC interoperability is now fairly routine.

But SVC interoperability depends on a much broader set of variables, including congestion control and quality of service parameters. So be sure to query edge switch suppliers and service providers about this issue.

ATM switches designed for carrier networks are likely to be too overpriced for use in all but the largest private networks. While ATM workgroup and private network backbone switch prices can be an order of magnitude more than, say, a LAN switch with the same number of ports, ATM switches for carrier networks can run still another order of magnitude more.

Indeed, vendors of carrier-oriented ATM switches, including Alcatel Telecom, Lucent Technologies, Inc. and Northern Telecom, Inc., declined to provide even a starting price for their carrier switches.

The adage that "If you have to ask the price, you probably can't afford it" is likely to apply in these cases.

The carrier-class ATM switch is structured somewhat differently from its private-network sibling, especially with regard to redundancy and fault tolerance. Management capabilities are also different from private-backbone switches in that carrier switches are designed to provide more call accounting information on the thousands of PVCs and SVCs going through them.

Still, from a technology perspective, there is nothing so radically different in the design of a carrier ATM switch that would warrant you paying the significantly higher price tag than what you would shell out for a private ATM network switch.

## ATM in the middle

Users considering ATM need to first decide where, tactically speaking, ATM fits into their networks. Few can afford the time, cost or disruption of overhauling existing networks and replacing everything — end-to-end — with ATM.

Workstations connected via 155M bit/sec ATM connections have at least three times the bandwidth of a 100M bit/sec FDDI LAN.

Because ATM is full duplex, users can be sending 155M bit/sec of data while receiving 155M bit/sec at the same time. FDDI is a shared media LAN, which means all stations contend for the 100M bit/sec of bandwidth it offers for sending or receiving.

Given the enormous bandwidth boost

## NetworkWorld Short List

## ATM equipment

The Short List highlights products Network World recommends you examine when shopping for ATM equipment. The vendors and products cited here are divided into the three main ATM equipment categories: switches; network interface cards (NIC) and adapters; and legacy LAN-to-ATM switches. These products can meet the needs of users with multivendor enterprise networks. Your needs may differ.

**ATM switches:** The ATM switch industry is subdivided into niche markets, including workgroup and private-network ATM switches; edge switches that provide access to carrier-provided ATM services; and carrier ATM switches. The undisputed leader in the ATM workgroup and private-network arena is **Fore Systems, Inc.** and its **Forerunner** products. Fore's technology has been so popular that it is being used in many other vendors' ATM products. For edge switches, check out **Northern Telecom, Inc.**'s **Magellan Passport**, a versatile and popular switch designed especially for this environment. In the carrier world, two vendors' latest generation ATM switches represent the state of the art in power, features and price/performance: **Newbridge Networks, Inc.**'s **36170 MainStreet** and **Cascade Communications Corp.**'s **500 ATM Switch**.

**ATM NICs and adapters:** The choice of vendors and products in this category is as equally diverse as switches. But if you're looking for proven interoperability with a number of vendors' switches, support for a broad range of workstations and servers, and price/performance leadership, be sure to include the products of **Adaptec, Inc.**, **Interphase Corp.** and **Fore** on your short list.

**Legacy LAN-to-ATM switches:** When it comes to connecting your existing LANs via ATM, the product you select will depend in large part on what LAN types you're now supporting. If your environment is anything like that of most large companies, you have multiple LAN types. In that case, be sure to check out **Bay Networks, Inc.**'s **Centillion 100**, **Cisco Systems, Inc.**'s **Catalyst 5000** and **Xylan Corp.**'s **OmniSwitch**. Each product is a modular system capable of supporting varied LAN types and offers impressive expandability as well as all the features needed to transparently run your LANs over an ATM network.

The survey was conducted by Focus Data, an independent market research firm in Framingham, Mass., that gathers primary data concerning the enterprise network environments and needs of end-users. To purchase full survey results, call Mona Dabbon at (508) 626-2556, or send E-mail to [mdabbon@focusdata.ultranet.com](mailto:mdabbon@focusdata.ultranet.com).



that ATM brings to the picnic, you need to apply this bandwidth prudently and appropriately, and to the extent your budget allows.

If you or your chief financial officer decide — after some preliminary designs and looking over a request for proposal or two — that you will keep ATM within the backbone for now, you will need to mate your existing legacy LANs to that backbone.

Products are available that permit most popular LAN types to connect to, and over, ATM. But the design of such mixed-technology environments needs to be carefully worked out to ensure that ATM's advantages of speed, concentration and multiplexing based on cell switching are exploited. And users developing such designs need to learn, too, about the current amalgamation of standards that are used for marrying LANs to ATM.

For example, nearly all of the legacy LAN-to-ATM switch products in the Buy-

interface card (NIC) or adapter fairly straightforward. If you like, you can pick the least expensive one that supports your workstation or server bus and the speed you want. Just about every NIC and adapter listed in the Buyer's Guide chart on page 100 supports one or more of the key ATM standards, such as LANE, UNI 3.0 or 3.1, TCP/IP over ATM or bridging over ATM.

But be aware that there are differences

among these products, especially in performance. For example, some NICs do most or all of the ATM cell processing on their own, whereas others rely more on the host system's processor. There are other issues as well, such as the amount of memory and buffers on the NIC and the processing power it has to segment packets into cells and reassemble them.

The bottom line is this: With all the pieces in place, the prospects for ATM are

good, especially with prices continuing to spiral downward.


*Mier is president of Mier Communications, Inc., a Princeton Junction, N.J.-based network consultancy, product test center and technical publisher that will release next month the third edition of its "Taking ATM to Task," a report on ATM equipment, suppliers, technology and market trends. He can be reached at (609) 275-7311 or at ed@mier.com.*

Visit Network World Fusion for more ATM coverage. You'll get links to our ATM: From LAN to WAN special section that include:

- A cover story recapping movements in the adoption of ATM standards
- A look at how Argonne National Laboratory is employing ATM
- The results of a Mier Communications test of ATM switches from Agile, Bay, Fore, 3Com and Xylan

Type the number to the right in the DocFinder box on the home page.

Network World Fusion  
http://www.nwfusion.com



er's Guide chart on page 96 support the ATM Forum's current LANE specification as well as the Internet request for comment for carrying TCP/IP over ATM. And choosing the most popular interface specifications for your ATM gear will entail careful investigation and ongoing monitoring.

You should scrutinize legacy LAN-to-ATM switches to learn exactly how they handle various forms of LAN traffic, such as broadcasts and multicasts. Often there are special mechanisms, or limitations, involved when it comes to broadcasts and multicasts.

Some legacy LAN-to-ATM switches are designed to work with another, separate ATM switch when it comes to certain LANE services, such as translating between the media access control address of LAN packets and corresponding ATM addresses.

Fore Systems, Inc.'s ES 3810-Ethernet Switch, for example, relies on an ATM workgroup or backbone switch for this function. Other legacy LAN-to-ATM switches include such functions integrally.

If you want to extend your ATM network to include workstations or servers, you'll find selecting an ATM network

DIGEX =

FAULT-TOLERANT  
NATIONWIDE  
DS-3  
NETWORK

The Internet waits for no one. If your business is serious about taking advantage of everything the Internet has to offer, call DIGEX today. We provide superior technical performance backed by the best 24x7 customer service in the business. We are the business Internet experts. Call us on it.



**Specialized Business Internet Solutions Now.**

**1-888-312-4851**

www.digex.net

Circle Reader Service #52



# Internet health report

Continued from page 1

the situation won't likely get better until some major standards issues get settled and resulting products filter out—probably a year from now.

That's not to say the Internet is broken; it plugs along every day delivering E-mail, supporting large file transfers and barely keeping pace with the demands of World-Wide Webusers.

However, a series of elements threaten the existing 'Net infrastructure. Carriers are scampering to stay ahead of capacity requirements, while at the same time dealing with some high-profile failures. The Net's workhorse routers are buckling under the strain of unchecked network growth; they often become confused due to changes in the network, losing blocks of data wholesale and sacrificing performance. Traffic exchange points are often clogged.

Underscoring the 'Net's fragility, some carriers are even offering enhanced Internet services that provide access to the Internet, yet move traffic over private conduits.

All of these technology issues aren't lost on users. In a *Network World* survey of 200 readers, 65% of respondents say the reliability of the Internet has either gotten worse or stayed the same in the last six months; only 30% say it has improved.

"A company that's spending its money to have reliable communications has to use a privately contracted network with guaranteed response times," says Seldon Ball, a computer technical adviser at the Wilson Synchrotron Laboratory at Cornell University in Ithaca, N.Y. "The public Internet is just not reliable enough for that. It's not something you can bet your company on today."

Guy Cook, president of Colorado SuperNet, a superregional Internet service provider that hosts Web sites for corporate titans such as General Motors Corp., doesn't wholly disagree. "The challenge now is to make this a more reliable network," he says. "What we're dealing with is a relatively immature network infrastructure that needs to be further developed."

Cook doesn't expect a catastrophic outage of the Internet anytime soon, although he does see an increase in the frequency of brownouts or other events. Then there's Bob Metcalfe, who repeatedly has warned the networking community that the Internet is on the verge of a collapse of catastrophic proportions.

Metcalfe, who gained fame for inventing Ethernet and now works for NWparent International Data Group, recently softened his stance slightly,

agreeing with Cook that there will be an increase in the frequency and the impact of outages and service brownouts. Considering recent events, Metcalfe's original vision seems prophetic.

A series of human and technical mishaps last month knocked out America Online, Inc. and its 6 million customers for nearly a day. Back in June, Netcom On-Line Communications Services, Inc.'s backbone took a major hit that stranded 400,000 users without service. Apex Global Information Services, Inc. (AGIS) this spring experienced router snafus and suffered outages due in part to a meltdown between its network center and a major Internet traffic exchange point.

And even MCI Communications Corp. — which many say carries the bulk of Internet traffic — announced a moratorium on new dedicated access customers for its Internet service between mid-February and mid-March when the carrier pushed through a badly needed capacity upgrade.

Those are only some of the publicly acknowledged events. There are scores of others everyday, "some which are minor and others which are major," according to Phil Lawlor, president of the Dearborn, Mich.-based

"[Packet loss] problems seem to be getting worse, despite the aggressive use of route damping," says Merit's Craig Labovitz.



JON MURESAN

AGIS.

Are these the strains of a network ready to collapse? They could be. Although some, including many ISPs, say they are only a chain of unrelated occurrences, Metcalfe doesn't think so.

"The problems are systemic," Metcalfe says. "The billing mechanisms, the settlement mechanisms and the management operations just are not there; hardware is not ultrareliable, and the software is susceptible to human error as we saw in the Netcom case. It's going to get worse before it gets better."

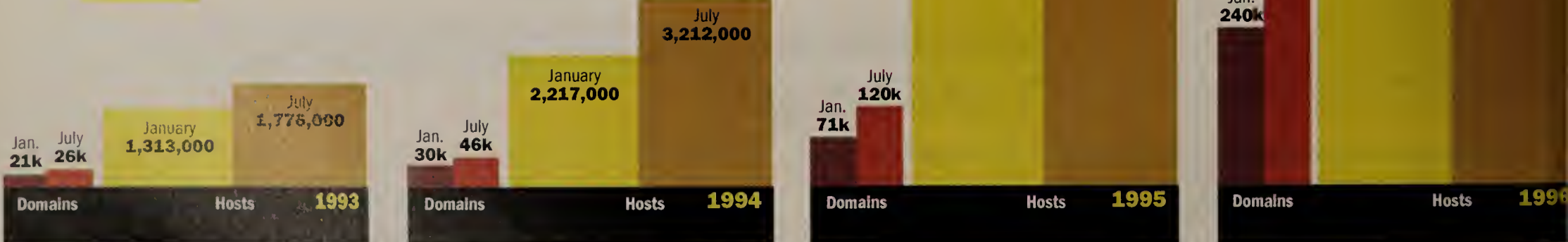
## Rudderless ship

What's happening with the Internet is more than the fits and starts of technology; the very organizational underpinnings of the Internet have been ripped out and replaced by a loose structure that relies on competition to deliver the appropriate services in a

## DRAMATIC GROWTH HAS MADE THE INTERNET UNSAFE FOR CRITICAL DATA

Note: Domains are groups of addresses owned by a particular concern. For example, *Network World's* domain is *nww.com*.

SOURCE: Network Wizards. This data is available on the Internet at <http://www.nw.com>





reliable and a cost-efficient manner. Lost in the transfer of the Internet from a publicly run facility to a privately owned and operated hodgepodge of networks is the control and guidance that the National Science Foundation (NSF) previously exerted.

Today, network operators are responsible for their own infrastructure, but no one has overall responsibility for the 'Net. "People report no problem with their component, but the system as a whole is losing traffic," says Mark Luker, program director for NSF Network.

The Internet has undergone remarkable change since the NSF retired the NSFNet backbone in April 1995.

What once was an architecture that revolved around noncommercial traffic feeding into NSFNet from downstream research, military and other nets, has evolved into a collection of about a dozen core backbone providers. These companies — known as network service providers (NSP) — share commercial and research traffic at exchange points (see story, page 108). Local and regional ISPs contract with backbone providers to carry their traffic for the long haul.

"It has become a much larger, more stratified and more costly entity within which to operate," says Gordon Cook, editor and publisher of "The Cook Report," an authoritative newsletter about ISP activity.

It is precisely that backbone diversity that leads NSPs and others active in the Internet community to brush off Metcalfe's claims. "Multiple transient outages have occurred, and they cannot be nailed down to any one thing — much like the phone network," says Pat Craig, group manager of IP services for Sprint Corp., a major Internet backbone provider.

"All of the large providers have had periods of genuine horror shows in the network, and we've all taken turns catching javelins," says Michael O'Dell, chief technical

officer for UUNET Technologies, Inc. The Internet has been designed to withstand major outages, even a nuclear attack, O'Dell adds. "It's hard to imagine something that will produce a worldwide failure of the Internet."

There are signs though, that the Internet is heaving under enormous strain.

A *Network World* survey of major NSPs revealed that for different pro-

viders, traffic loads have tripled, quadrupled and — in MCI's case — increased 3,000% over the same time last year.

Many of the measurements captured by the Route Arbiter — an NSF funded project to collect network statistics — indicate a degradation in performance since the breakup of NSFNet, says Bill Norton, network engineer with Merit Systems, Inc., an Ann Arbor, Mich., organization that oversees the Route Arbiter project. Norton also chairs the North American Network Operators Group, a coalition of ISPs that make decisions on Internet operational issues.

"We're not at the level of performance we had with NSFNet, but then again it didn't have nearly the number of users supported today," Norton says.

The overwhelming popularity of the Web is also leading to congestion and sapping performance all across the Internet.

"Every Web connection has a whole bunch more independent connections hidden under the covers," says Dan Benjamin, an Orlando, Fla.-based Internet consultant. "Eventually, we're faced with having to rethink how applications are deployed on the Web."

Another source of congestion are the exchanges where NSPs hand off traffic destined for another provider's network. NSPs constantly refer to these sites as choke points where data backs up on access lines and where overloaded equipment melts down.

A host of equipment, network

Rob Hagens  
says upgrading  
MCI's Internet  
backbone from  
45M to OC-3  
was "an easy  
sell" to top  
management.



design and policy issues contribute to congestion at these sites. Increasingly, NSPs are making an end run around the exchanges by setting up one-to-one deals, known as peering relationships, with other carriers.

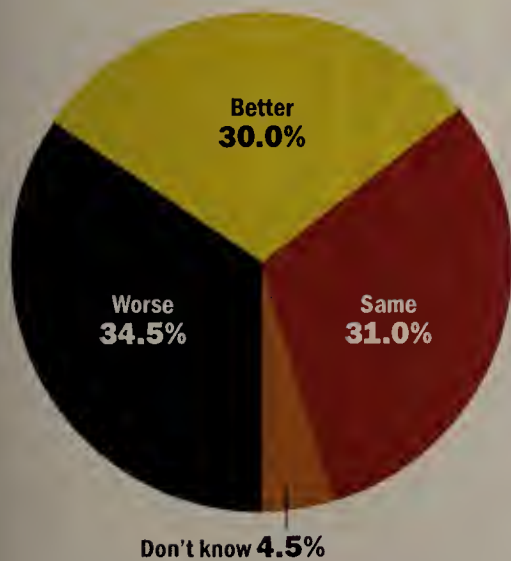
#### Flap trap

An issue that may ultimately pose a more serious threat to the Internet's reliability than capacity problems is a phenomenon called route flapping.

Route flapping occurs when an Internet-attached router intermittently ceases transmission across a wide-area link. This can be caused by configuration errors, status changes in net links, software bugs and other problems.

Most commonly, a router looks for administrative packets shipped over a link; these packets advise about route changes and status across the Internet. If the administrative message is not received, the router eventually stops transmitting over the questionable link. Only after other routers broadcast messages that the link is viable will the router resume transmission. Thus

Would you say the reliability  
of the Internet has gotten  
worse or better over the past  
six months?



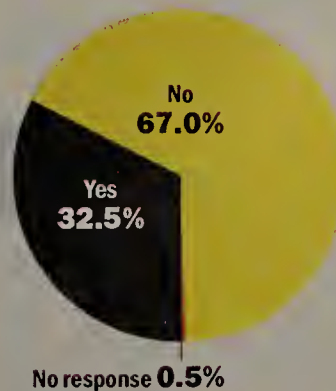
SOURCE: Survey of 200 *Network World* readers with responsibility for purchasing Internet services.

Do you expect you would  
one year from now?



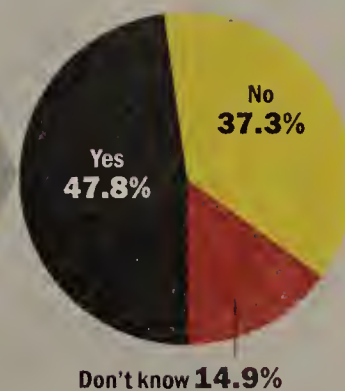
Respondents  
who said "yes."

Do you at this time use the  
Internet to support  
applications or data that is  
critical to your organization?



Respondents  
who said "no."

Do you expect you would  
one year from now?



SOURCE: Survey of 200 *Network World* readers with responsibility for purchasing Internet services.



the line flaps up and down, according to Jordan Becker, vice president of network services at backbone service provider ANS.

This is becoming an especially troublesome issue for NSPs or ISPs that don't have the memory or the hardware in place to deal with it, says Craig Labovitz, a network engineer with Merit Systems. Instability caused by route flaps results in poor

performance for the end user and makes sites momentarily unreachable, he says.

Compounding the issue is the fact that route tables for the Internet have grown wildly complex, leading to a situation where routers can't keep up with the changes. If a router's forwarding cache becomes invalidated by a lack of updates, the router doesn't know how to forward packets. "Essentially, the processor gets a firehose directed at it, which causes some very ugly failure scenarios," says UUNET's O'Dell.

#### How serious is route flapping?

Mark Kusters, the principal investigator for the Internet Network Information Center, labels flapping as "the biggest issue the backbone ISP community is dealing with." Route flaps are occurring with greater frequency at the core of the Internet. Current router technology is "stretched to the breaking point," he says. "Routers often spend more time with routing updates than they do with sending user data."

According to a Web posting at the Routing Arbiter, "severe levels of routing instability can lead to poor network performance (such as packet loss, latency and interruptions of service)." Cisco Systems, Inc., whose routers dominate on the Internet, has teams of experts roaming

among ISPs to milk the most from the routers and ensure they don't seize.

At one point last spring, the Routing Arbiter posted packet loss numbers of 30% to 50% for some NSPs. A 10% loss is noticeable in service performance, while a 50% loss almost renders a service unusable, Labovitz says. Even today, during daily peak periods, he says, it is not uncommon to see a few providers with packet loss rates of 30%. A good deal of that is tied to fluctuation in routing tables.

Part of the reason that routes flaps have become prevalent is the growth of the Internet. As you increase the number of routers across the 'Net, routing tables grow enormously, and some routers eventually lose track of all the possible routes required to calculate a least cost path.

"Their opinion of routes is different," says Brent Bilger, director of product marketing for Cisco's Service Provider Market unit. "When routers get out of sync with other routers, then you have problems in your internet."

Cisco, whose routers are used by almost every NSP, has deployed a route damping algorithm to lessen the effect of route changes. In essence, the routers are taught to ignore some of the routing updates. That leads to a trade-off between information suppression and route optimization, UUNET's O'Dell says. "The

more you aggregate routing knowledge, the greater the chance you will produce less optimal routes."

Officials at MCI and Sprint say route damping methods have all but eliminated the problem from their backbones. But Merit's Labovitz says, "The problems seem to be getting worse, despite the aggressive use of route damping." Carriers are beginning to mandate use of Complex Inter Domain Routing address blocks, which are analogous to area codes and are meant to reduce the number of updates flowing across the 'Net.

#### Capacity constraints

While ISPs must contend with the route flap events, they also must be on the lookout to throttle back congestion as it flares up. Most NSPs today closely guard the capacity percentages of their backbones, fending off questions about capacity limits by saying their backbones are not stressed.

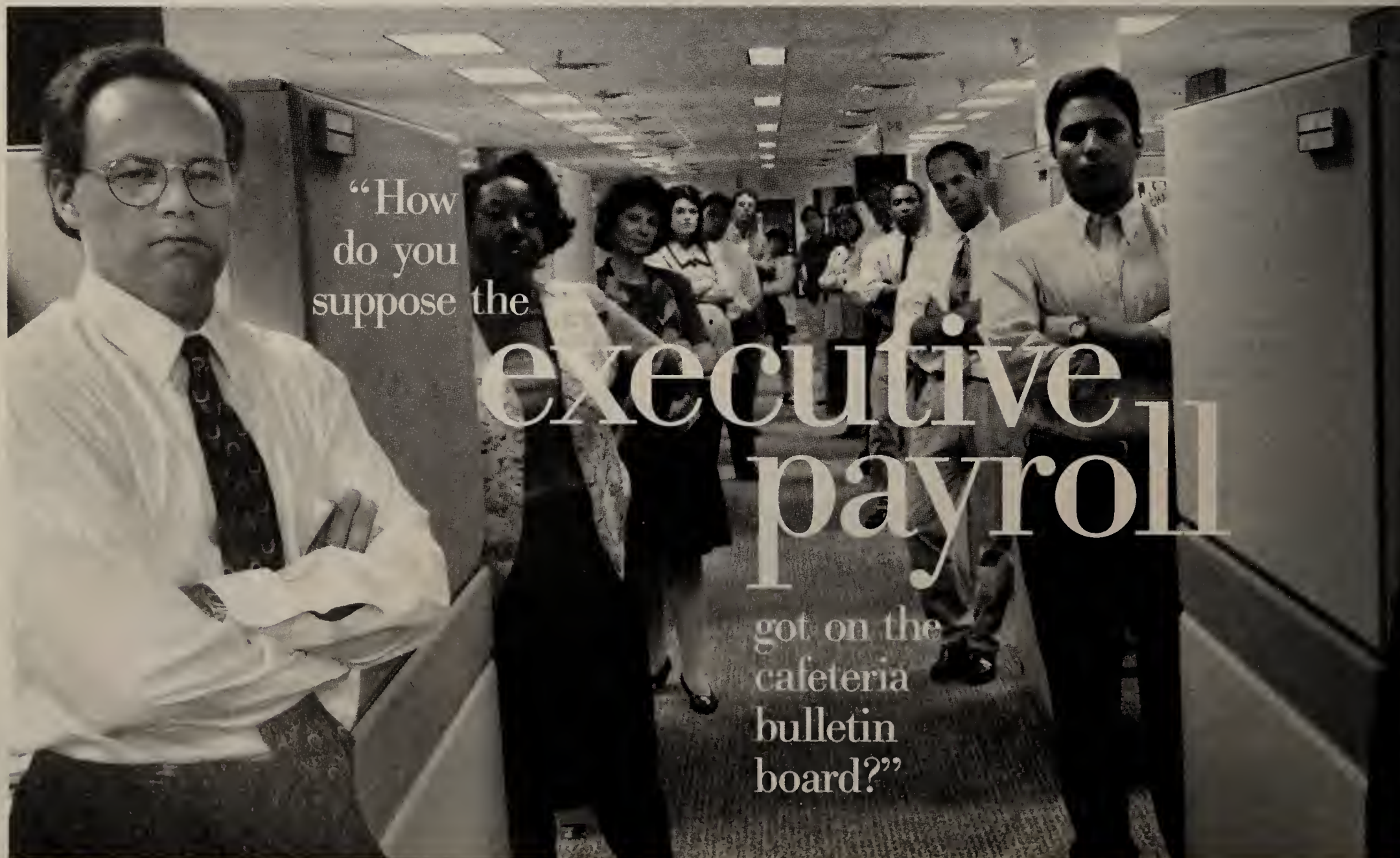
But consider the plight of MCI, which last spring would not allow new dedicated access customers to hop on its network for an eight-week period. MCI's backbone was in serious trouble back then, with packet loss rates of 20% to 30% on most of the West Coast.

Rob Hagens, MCI's director of Inter-  
*Continued on page 109*

#### There's more on Fusion:

- The Routing Arbiter site maintained by Merit Systems is expected this month to launch NetNow, a prototype tool that provides real-time NAP and ISP backbone delay and packet loss performance statistics.
- Check out what ISPs, NAP operators and others had to say about the state of the Internet at the May 1996 North American Network Operators Group meetings.
- A visual map of the network service provider interconnections and traffic exchange points. Includes hotlinks to NAP traffic statistics.
- The Internet Weather Report, a daily MPEG map that displays congestion hot spots and other conditions on the network.

Network World Fusion  
<http://www.nwfusion.com>



IBM is a registered trademark and Solutions for a small planet is a trademark of International Business Machines Corporation. ©1996 IBM Corp. All rights reserved.

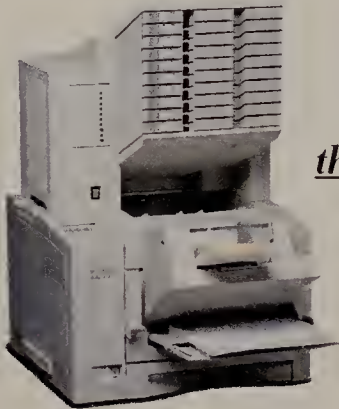


INTERNET BACKBONE PROVIDER INFRASTRUCTURE COMPARISON

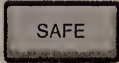


	Backbone speed (blt/sec)	Number of POPs	Number of POPs supporting top speed	Net makeup	Circuit providers	Network access points supported							Private links to:
						Ameritech	CIX	DIX	MAE-East	MAE-West	Pacific Bell	Sprint NAP	
Apex Global Information Services	155M	200+	22	ATM, dedicated circuits	LDDS, WorldCom, Teleport Comm., RBOCs	●	●		●	●	●	●	
Advanced Network Services, Inc.	45M	103	20+	Dedicated circuits	Declined to provide		●		●	●	●	●	MCI
BBN Planet	45M	350	25	ATM, dedicated circuits, frame relay	AT&T, MCI, WiTel		●	●	●	●		●	(1)
DIGEX, Inc.	45M	30 (2)	30	Dedicated circuits	Cable+Wireless, MCI, WiTel		●	●	●	●		●	
MCI	622M	450	450	ATM, dedicated circuits, frame relay	Declined to provide	●	●		●	●	●	●	12 ISPs
NetCom On-Line Communications Services, Inc.	45M	240	12	ATM, dedicated circuits	AT&T, WorldCom, LECs	●	●		●	●	●	●	
PSInet	45M	350	25	ATM, dedicated circuits, frame relay	Declined to provide			●		●	●		SMDS Washington Area Bypass
Sprint	45M	400	400	Dedicated circuits	Sprint	●	●		●	●	●	●	
UUNET Technologies	45M	745	41	Frame relay	Declined to provide		●		●	●	●	●	(3)

Footnotes: (1) BBN Planet has private peering with UUNET East, UUNET West, MCI Atlanta, MCI Boston, MCI San Francisco, MCI Washington,D.C. and PSInet Washington D.C. (2) DIGEX expects to have 61 POPs by year-end. (3) UUNET also connects to MAE-Houston, and says it will soon have a direct link with Sprint.  
Key: CIX = Commercial Internet Exchange, DIX = Digital Internet Exchange, MAE = Metropolitan Area Exchange

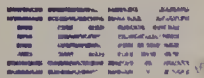


*The secure mailbox feature of the new IBM® Network Printer 17 will help settle your stomach.*



Sometimes networks can cause you to share a lot more than you should. That's why we developed the secure mailbox feature for our new Network Printer 17. With 10 lockable output bins, it's like having 10 printers for the price of one. So you can share the resource, but still maintain your privacy. (And the office practical joker will have to find something better to do.) Call 1 800 IBM-2468, ext. 1A130, for more information on the new IBM Network Printer family. Or visit our home page at [www.can.ibm.com/ibmprinters](http://www.can.ibm.com/ibmprinters)

Solutions for a small planet™





## Routing across the 'Net — pass the hot potato

**W**hen the NSF Network backbone was decommissioned in April 1995, it was replaced by four network access points, basically exchanges at which commercial Internet service providers could pass traffic to one another. Ever since, ISPs have been rewriting the 'Net routing rules.

If you're trying to contact a resource located on your service provider's network, the process is simple: Traffic is sent to the ISP's router, which does an address lookup, identifies it as an on-network destination and sends it on its way. But contacting a resource off your provider's network is another story.

Backbone ISPs — known as network service providers (NSP) — do not want to incur the cost of carrying traffic destined for another provider's network. So each will find the nearest point at which it can hand off data to the destination network or to an intermediate transit provider — a practice known as hot potato routing.

The graphic (at right) shows a hypothetical example of how traffic might flow between users in Boston and Seattle. Note that, instead of handing

off data to an intermediate NSP, any two NSPs may have a special peering agreement, where they nail up a dedicated circuit via which they exchange large loads of data, such as the one between NSP A and Z in the example shown. On the return trip, NSP Z will likewise look for the nearest location to hand off traffic — in this case, the exchange point in San Jose, Calif. In this fashion, each NSP winds up paying its fair share of transport costs.

What NSPs and ISPs don't want is a local or a regional provider that dumps traffic to a backbone carrier but has no presence elsewhere in the country to handle an equitable load of return traffic.

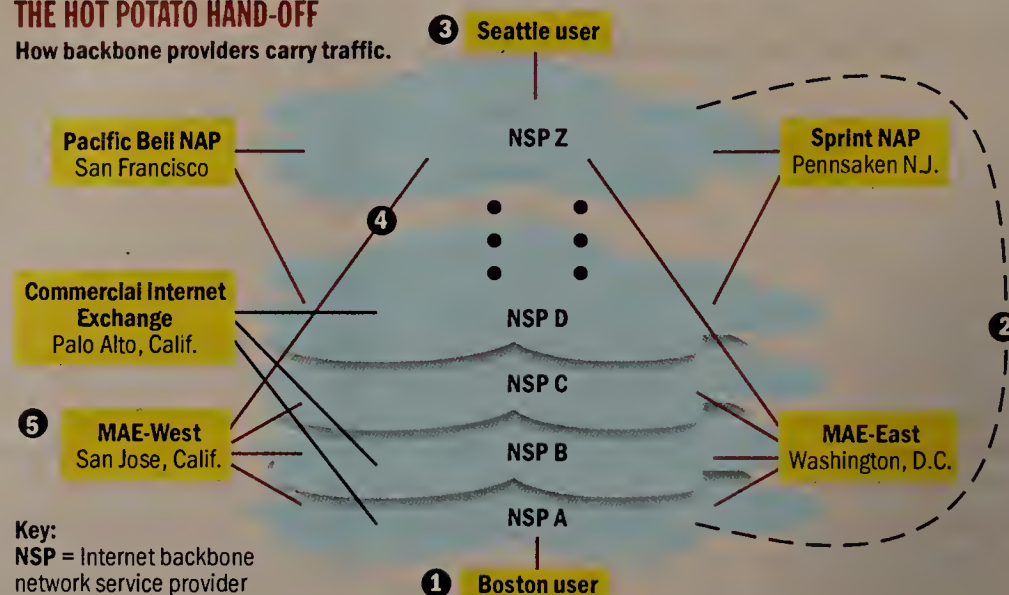
In that instance, the local or regional provider must pay the backbone carrier for transit carrying charges.

"When you purchase service, by default you're choosing a backbone provider," says John Curran, chief technology officer for BBN Planet. So, even though you may be dealing with a local or a regional entity, you should learn about their upstream backbone provider.

There is an exception to this procedural routing system. Some service providers offer enhanced IP services or so-called private Internet services. Basi-

### THE HOT POTATO HAND-OFF

How backbone providers carry traffic.



1. Boston-based user attached to NSP A sends E-mail to Seattle company attached to NSP Z.
2. NSP A looks for nearest exchange point, which turns out to be a private interconnect in Boston with NSP Z.
3. Seattle recipient replies.
4. NSP Z looks for closest place to hand off data to NSP A. The private interconnect is no longer an option because the destination NSP is expected to bear the bulk of transport costs.
5. NSP Z ships data to MAE-West in San Jose, where it is handed to NSP A for delivery.

cally, these services give you a connection to the Internet, but your data rides over the service provider's backbone until it reaches the nearest point of exit to its destination. "We can control the quality of our service on an end-to-end basis," says

Pat Craig, Sprint Corp.'s group manager of IP services. Some customers, he says, want this type of service to engineer parallel lines, with one for higher priority traffic.

— Charles Bruno

"It seems like

# only yesterday

I sent my proposal  
to the color printer."











Continued from page 106

net engineering, says an upgrade of the backbone from 45M bit/sec to OC-3 was "an easy sell [to top management] because Internet backbone services is one of the great new revenue areas of the future."

Other sources say MCI's Internet division may have supported the upgrade, but top management waffled on the investment until the company started turning away dedicated access customers.

To understand MCI's capacity woes, consider this: The carrier's ATM-based Internet backbone now handles 250 terabytes a month — that's a whopping 3,000% increase over this time last year. (A terabyte is equal to 1 million megabytes.)

Part of the problem, not only for MCI but for other ISPs, is predicting the loads they will be carrying, says Scott Bradner, a consultant in Harvard University's Office of Information Technology.

In the early days of the Internet, Bradner says it was possible for carriers to oversubscribe a line by 8 to 1 — even 20 to 1, in some cases — because users were typically exchanging only E-mail. That meant a carrier could sell you a T-1, for instance, and multiplex your data along with other users' onto a single T-1 feed linked to the core of the network.

"That worked fine until the distortion

brought about by the Web," Bradner says. Now, it is much more difficult for carriers to estimate what percentage of a line users will tie up. That forces NSPs to add infrastructure at the core to handle capacity demands. In addition, many backbone providers carry traffic for resellers that oversubscribe their lines, wreaking havoc on NSP capacity planning.

Tending to ever-changing capacity requirements certainly reduces congestion on NSP backbones, but there are other points of congestion, too. Almost every backbone provider fingers the Internet's traffic exchange points as congestion culprits.

The exchanges are simplistic interconnects that usually rely on an FDDI or, less often, an ATM switch to pass traffic among dozens of NSPs and ISPs. Service providers purchase one or more ports on the switch. They may also choose a less costly option, such as a 10M bit/sec connection to an attached FDDI ring, or they can lease a port on an FDDI hub that links the ring to the on-site switch.

Connecting to a switch is just the first

step; each NSP is then responsible for hammering out traffic exchange agreements with any number of NSPs or ISPs present at the site.

In effect, the exchange operator has little responsibility — other than maintaining the working order of the switch and any attached rings.

"A lot of problem reports are handled by the NSPs because so many of the events happen in the complex routing layer," says B.J. Chang, director of technology programs in the Advanced Networks Group at MFS Communications, Inc. MFS operates several exchanges known as Metropolitan Area Exchanges (MAE). MFS's Washington exchange — MAE-East — was one of four original NSF-funded exchanges.

Eighteen months ago, when the NSF decommissioned NSFNet, it funded establishment of four network access points (NAP), which were the first Internet exchanges. Under NSF provisions, each of the four NAPs — located in Pennsauken, N.J.,

Washington, D.C., Chicago and San Francisco — has to be connected to at least two others to provide for alternate path routing in the event of an outage.

The NSF recently curtailed funding of the four NAPs, citing their success as commercial entities.

Chang says many of the Internet exchanges are getting a bad rap over the congestion issue. "The place where congestion seems to occur is not in the exchange, but in the access links that lead to the exchanges," she says. For instance, the shared ring some exchanges operate may become saturated.

"There is no method of congestion control in this setup," says AGIS President Phil Lawlor. "Any one participant could flood the others' full access capabilities."

#### Second-tier relief

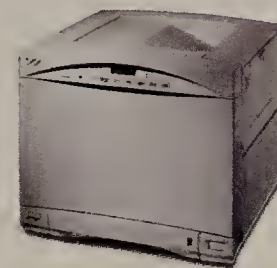
An entire second tier of Internet exchanges is beginning to dot the 'Net landscape in places such as Phoenix, Los Angeles, Houston and Dallas. Digital Equipment Corp. just entered the business, launching the Digital Internet Exchange (DIX) in Palo Alto, Calif., where it will provide service for the Commercial Internet eXchange, BBN Planet and others.

While most exchanges are operated by a carrier that supplies the circuits leading

## OVERFLOW WARNING

**MFS Communications Company, Inc.'s MAE-East connects major domestic ISPs, as well as European providers.**

**Since June, the suburban Washington, D.C. facility has been switching at near capacity of 380M bit/sec, up from 200M bit/sec.**



**The faster throughput of the new IBM® Network Color Printer**  
**will put time on your side.**

**ZOOM**

If you've ever been held hostage by your color printer you'll appreciate the new IBM Network Color Printer. Its best-of-breed EFI® Fiery XJe™ controller processes documents up to six times faster than other color lasers without sacrificing quality. And its RIP-While-Print™ technology will have you breezing through demanding jobs. The IBM Network Color Printer is rated at 3 ppm. And it'll seem even faster the first time you make it home before dark. Call 1 800 IBM-2468, ext. 1A135, for more information. Or visit our home page at [www.can.ibm.com/ibmprinters](http://www.can.ibm.com/ibmprinters)

Solutions for a small planet™





# NetworkWorld

## TECHNICAL SEMINARS

"Don't miss out!  
Join thousands of your  
colleagues who continue to benefit  
from this valuable, essential training."

# INTERNETWORKING:

## Designing LANs, WANs and Broadband Networks

The ever-changing internetworking landscape, fueled by emerging broadband technologies, dramatically challenges traditional LAN and WAN architectures. Network professionals must now integrate local and wide-area networks with new technologies including fast Ethernet, ATM, frame relay and SMDS. These and other new technologies hold the promise of more efficient and ever-faster communications across enterprise networks.

Taught by Mark Miller or Dr. Carl Shinn, both leading consultants and internetworking experts, this seminar will teach you how to design and implement multiprotocol, multi-operating system internetworks that seamlessly integrate both legacy and emerging technologies.

### This information-packed two-day seminar will help you . . .

- Evaluate internetworking hardware and software solutions for optimum network operation
- Analyze repeaters, bridges, switches, routers and gateways to determine which one is appropriate for a particular configuration
- Prepare for the next generation of internetworking challenges: Frame relay/SMDS, frame relay/ATM and SMDS/ATM connections
- Understand key internetworking protocols such as TCP/IP, IPX/SPX, X.25 and XNS
- Determine bandwidth requirements for both leased line and broadband circuits utilizing traffic studies

**DIRECTED BY  
MARK MILLER**

- Troubleshoot your environment through case studies that detail protocol operation and illustrate typical internetworking challenges
- Understand the key internetworking features of AppleTalk, Banyan VINES, NetWare, OS/2 LAN Server and Windows NT
- Discover some key applications for narrowband ISDN technology
- Compare the operation of ATM, frame relay and SMDS, and discover the role of the broadband implementers: the Frame Relay Forum, the ATM Forum and the SMDS Interest Group
- Understand the detailed operation and key performance characteristics of Ethernet, IEEE 802.3, token ring and FDDI
- Evaluate the differences between Transparent Bridging, Source Routing and Source Routing Transparent Bridging internetworking standards
- Utilize available software tools for network optimization and modeling process
- See how SNMP plays a key role in internetwork management including the management and operation of broadband networks
- Understand the operation of IP-based routing
- Match the LAN application with the appropriate WAN broadband technology
- Understand TCP/IP and the Internet protocol suite, including ARP, ICMP, UDP, SMTP and TELNET
- Explore the internetworking challenges of remote access and wireless communications

### 1996 LOCATIONS AND DATES

New York, NY	Sept. 11-12	Boston, MA	Nov. 6-7
Chicago, IL	Sept. 24-25	Seattle, WA	Nov. 12-13
Washington, DC	Oct. 8-9	San Francisco, CA	Dec. 5-6
Atlanta, GA	Oct. 22-23		

If you are interested in sponsoring this event,  
please call 508-820-7520.

### \$895 REGISTRATION FEE INCLUDES . . .

- Comprehensive seminar workbook
- Copy of best-selling *Internetworking*, 2nd edition, by Mark A. Miller
- Four exclusive protocol reference guides: Ethernet, Token Ring, FDDI and LAN Cabling
- Valuable course diskette containing reference information on internetworking implementation, documentation and standards
- Free 6-issue subscription to *Broadband Networking News* — the leading newsletter for news and analysis on broadband networks
- Luncheon and break refreshments



**Broadband Networking News**  
Business News & Analysis of Frame Relay, ATM, and SMDS

Note: If you can't attend, a full attendee materials kit for the  
Internetworking seminar is available for just \$99.95!

### Web/E-Mail Information

Obtain full seminar information and register on-line in the  
Professional Development Group section on our Web site at:  
[www.nwwfusion.com](http://www.nwwfusion.com)

OR

receive full seminar information via e-mail by sending a request to:  
[seminars@nww.com](mailto:seminars@nww.com)  
Please put the word "LAN" in the subject field.

Call **1-800-643-4668**  
Register today for  
the seminar nearest you!

Dial Our **FAX-BACK** Information Line at  
**1-800-756-9430**  
for a complete seminar  
outline and registration form.  
When prompted, request document #80.

Official Sponsors

**3Com**

**make**  
SYSTEMS



up to the exchange switch, Digital will use a variety of telecommunications carriers, according to DIX Manager Al Avery. "If you become disenchanted with one service provider, you can switch to another without having to relocate your gear to another site," Avery says. The other advantage is ISPs and NSPs using the site can employ physically divergent paths into the DIX.

MFS' Chang believes the second-tier exchanges will ease the pressure on existing sites. "My theory is we'll see much more content distributed locally, and that will mean there will be less traffic trying to shove into the big exchanges."

NSPs, meanwhile, aren't sitting idle. Increasingly, they are reducing their reliance on the exchanges and setting up direct peering relationships with other providers. So, if two carriers have enough traffic to justify a DS-3 between each other, they will set up the connection instead of pushing the traffic to an exchange. Sprint, for instance, has set up

five direct exchange links with MCI and four with UUNET, Cook said.

MCI says it has 12 direct interconnects with ISPs. UUNET says it has four in place and two more on the drawing board.

"If the NAPs are congested, the private interconnects are the antidote," Cook says. Part of that antidote may be to cure economic ills; connecting to an exchange is a costly undertaking. According to "The Cook Report," the annual cost is about \$100,000, and many providers are tied in to multiple exchanges.

The private interconnects are "the only kind I'm building from now on," UUNET's O'Dell says. "The exchange points are unscalable. They will exist and provide a certain breadth of coverage, but they are doomed long term."

While NSPs and exchange operators grapple with these issues and more, some users remain unfazed. Indeed, 57% of respondents to the *Network World* reader survey say they forged ahead with Internet plans despite outages and brownouts. Only 19% of say they postponed projects out of concern.

Count Paul Zengilowski, president of Burlington, Vt.-based Data Clearinghouse Corp., are among the apprehensive. He says law firms often ask his clearinghouse if it uses the Internet to transport data to clients.

"They're asking us the question not because they want to know if we will, but because they want to make sure we are not using it," Zengilowski says. The main objection from law clients is security, but for Data Clearinghouse, "reliability of service is the real factor."

Phil DeMar, a network analyst at Fermi National Accelerator Labs in Batavia, Ill., brings up yet another issue. "The general perception in our community is that there has been some degradation in the type of

performance we've seen on the Internet over the past year or so," he says. "I think a lot of it is due to congestion."

It's hard to disagree with either user's assessment. While NSPs maintain that their nets are highly reliable, their move to direct connections for traffic exchange seems a sure sign that the NAPs and other traffic exchanges are problematic.

If you listen to the NSPs, they say route flaps are under control; yet other reports

indicate damping hasn't snuffed out all the fires. But, perhaps the biggest issue is the service providers' ability to stay ahead of capacity requirements. The key to that will be the emergence of bandwidth reservation and quality-of-service functions.

So yes, plans are underway to remedy many of these problems. But if you're betting corporate dollars and your career on what's out there, you'd better stay off the 'Net on-ramp.

Freelance writer Joanne Cummings of Marlborough, Mass., and *Network World Online* Senior Writer Chris Nerney contributed to this report.

**Next week:** A look at what service providers are doing to address congestion and reliability problems, and guidance on how to proceed with your Internet plans.

## EXPLOSION

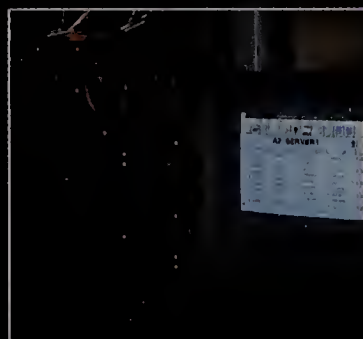
The Internet continues to double in size approximately every 12-15 months.

SOURCE: NETWORK WIZARDS, INC. MENLO PARK, CALIF.

# It's not a game.

## Pinpoint fiber connections with automatic tracking of configuration changes.

IFS/9000  
Intelligent Fiber System



See us at NetWorld +  
Interop Booth #720

Making the right connection can mean the difference between a business that is up and running and one that is stopped cold. Configuration changes without an effective, organized system of documentation can leave you in the dark.

Take off the blindfold. Intelligent Fiber System 9000 (IFS/9000) from General Signal Networks is the only fiber configuration management system with patented PC control. IFS/9000 automatically recognizes and updates its database whenever a fiber cable is moved. This built-in intelligence allows you to easily trace links and generate work orders. LEDs guide connection changes on the port panels. Microsoft Windows<sup>®</sup> based, IFS/9000's control system makes it easy to change network connections for ATM, FCS, FDDI, ESCON and other fiber applications.

Call General Signal Networks at 1-888-GSN-DATA and take control of your fiber connectivity.

**GENERAL SIGNAL**  
Networks

One Waterview Drive • Shelton, Connecticut 06484 • 1-888-GSN-DATA • <http://www.gsnetworks.com>





Interop DotCom

## THE INTRANET EVENT

# where the Internet means business

Did you ever feel like you were on a speeding roller coaster that had no brakes? If you are a corporate Webmaster, IS professional, network designer, or part of an Internet/intranet deployment team, you probably know the feeling well. The Internet is changing so fast that even the most conscientious professional is challenged to keep pace with the latest technologies, products, and practices.

Now there's one place Internet business professionals can go to see and learn it all. Interop DotCom, the only event dedicated to providing all the product and technology information needed to effectively deploy Internets and intranets in business.

Interop DotCom is produced by SOFTBANK Expos, the same folks who bring you NetWorld+Interop, the industry's leading

conference and exhibition on networking. Interop DotCom will coincide with NetWorld+Interop in Atlanta, September 16-20.

Call 800-488-2883 for your FREE pass or stop by our Web site at [www.interop.com](http://www.interop.com)

### Interop DotCom Atlanta 96

#### CONFERENCE:

September 16-18, 1996

#### EXHIBITION:

September 18-20, 1996

Georgia World Congress Center  
Atlanta, Georgia



# Revised GroupWise grows up

By Travis J. Berkley

With GroupWise 5, Novell, Inc. has enhanced almost every aspect of the groupware platform that began life as WordPerfect Office. The new product's messaging and conferencing capabilities are in the same league as those of Microsoft Corp.'s Exchange and Lotus Development Corp.'s Notes, but you also get integrated document management and workflow, along with easy administration that relies on the powerful Novell Directory Services (NDS). In other words, GroupWise 5 is a well-rounded groupware package that makes it easy to access and share information.

Our evaluation of a near-final beta version of the software revealed a product with more data access options than ever. Its open architecture supports many network operating systems and provides hooks for third-party applications to easily tie in. The system administration functions, now presented in a Windows-based environment, are more intuitive, more powerful and easier to navigate.

The server agents have been enhanced significantly since the release of GroupWise 4.1. While end users will not directly appreciate the changes, you'll probably have far fewer headaches when it comes to upkeep and load balancing.

any necessary conversions.

■ Administration Server is now an Administration Agent (ADA) that is responsible for functions such as adding users, meeting replication requests and domain database maintenance.

■ Post Office Server is now a Post Office Agent (POA) and handles post office message stores and libraries.

We tested all three types of agents for both NetWare and Windows NT.

One major enhancement is the ability to schedule maintenance at any time of day or night. You can schedule an "Analyze and Fix" job nightly, while each weekend you can run a more robust check that includes scanning contents and indexes. You can also schedule maintenance on the libraries that store document management information. To facilitate clean backups, you can tell the ADA to remain idle for a period of time. The interface to this feature was functional in our beta copy, but the developers had not yet enabled the buttons that caused the execution of scheduled events.

Another interesting feature is the ability to have numerous POAs servicing the same post office. Each POA interacts with client/server requests. For heavily used post offices, this can distribute the work-

load over many different machines and processes to help with load balancing. We used the NetWare Loadable Module (NLM) and NT agent simultaneously with two machines and experienced no problems.

Administration of all facets of GroupWise 5 is handled within the NetWare Administrator program, NWAdmin, through the use of snap-in modules. Four new tabs in the Details windows offer options for each GroupWise user. Also, a View option can be activated to show domain and post office

information in the top pane and user, resource and library information in the bottom pane (see Figure 1).

For most of the system maintenance in GroupWise 4, administration was a tedious process, performed largely one

## NetResults

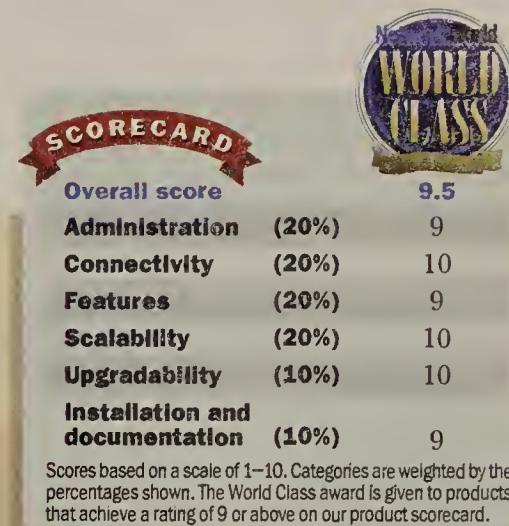
Product : GroupWise 5

Vendor : Novell, Inc.  
(800) 453-1267  
(801) 429-7000  
www.novell.com

Price : 100 mailboxes - \$13,340

Pros :  
▲ Flexible administration  
▲ Will support 7 server and client platforms by year-end  
▲ Integrated message and document sharing  
▲ Many connectivity and gateway options

Cons :  
▼ Requires Novell Directory Services, meaning sites without NetWare 4.1 will have to upgrade  
▼ Moderate learning curve for new administrators



user at a time. Maintaining GroupWise now is as simple as pointing to any resource in NDS and clicking on System Maintenance. Repairs, if necessary, are handled by either the ADA or the POA, whichever is appropriate. As with the previous version, maintenance may be performed while users are active in the system.

Since GroupWise administration is built around NDS, it can be centralized or distributed. With the previous version of GroupWise, administration could only occur on a domain level. Additionally, different people can be given different administrative chores.

### Have data your way

Connectivity and the ability to get to your data in a variety of ways is a strong point of GroupWise 5. For backward compatibility, Novell designed the GroupWise 5 MTA to be compatible with the GroupWise 4 remote clients. The MTA performs message conversion from Version 5 to Version 4, and can upgrade post offices one at a time in a domain.

GroupWise 4 clients used shared post office box files, which put the burden of data manipulation on the client. If your server lacks processing power, this could be an acceptable solution, and, in fact, this option is still available in GroupWise 5 and functions in the same manner. However, it does require that the client have some form of direct access to the post office, making it possible for the user to accidentally delete or corrupt data.

GroupWise 5 offers an additional client/server option in which the message stores are always on a file server. Users communicate with the agent via TCP/IP, which means no direct drive mapping to the server is required. Users do not have to be authenticated to the server.

With this option, the client makes

requests directly to the POA. Since the administrator is free to implement many POAs for a single post office, the agents can be moved to points on the network that balance the load, eliminate bottlenecks and facilitate faster response. It also provides tighter security, since the client does not need direct access to the post office.

Remote users used to require a product that kept separate databases and address books and synchronized them when connections were made to the PO,

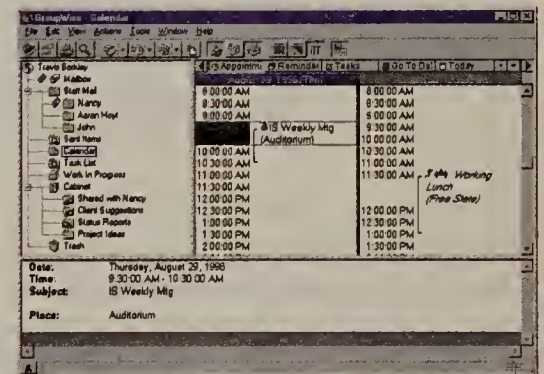


Figure 2: The main window of the 32-bit GroupWise 5 client shows the mailbox, calendar and file cabinet in the left pane. You can quickly see what folders have new items by the icons on the left of each folder. The Quick Viewer appears in the lower pane.

much the same way Lotus Notes performs replication. The new client comes with remote capabilities bundled in. If you select "Hit the road" from the Action menu, it downloads copies of whatever you select locally to, say, your laptop. When you make a connection, select the same option and GroupWise sends copies of the messages, addresses and whatever else you created, updates the message stores on the server and you're back in client/server or file-sharing mode again.

For users on the go, Novell's Web Access is a handy way to access personal information without the need for a spe-

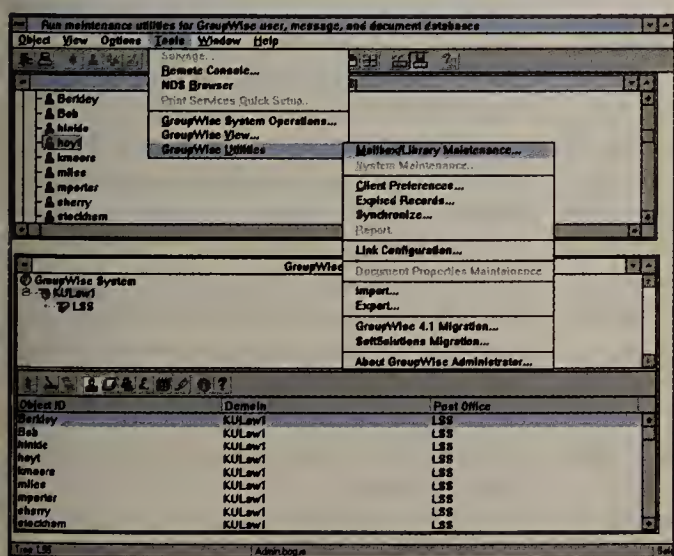


Figure 1: You can launch maintenance on a GroupWise user from NWAdmin, shown here with the new GroupWise view and snap-in options.

Another big change is the servers of GroupWise 4 are replaced with agents in GroupWise 5:

■ Message Server is replaced by a Message Transport Agent (MTA) that transports data between message stores, performing



your complete post office box. Web Access was released recently for GroupWise 4, and a version that works with GroupWise 5 will ship with the initial release. It will have the same functionality as the current Web Access version, meaning only those functions available in GroupWise 4 will be included. A version planned for late this year or early next will support message attachments, document management and access to shared folders.

Any Messaging Application Programming Interface (MAPI) 1.0-compliant mail client can also access the GroupWise 5 message stores, either through file sharing or client/server access. For example, using the standard Microsoft Exchange client that ships with Windows 95, we were able to access our GroupWise 5 mailbox. Exchange still displays information in its native format, so items such as appointments appear as mail messages, but they are accessible.

Within two to four months after the initial release, GroupWise 5 is slated to have a back end available to provide Post Office Protocol 3 (POP3) and Internet Message Access Protocol 4 services. This was not available for evaluation.

Like its predecessor, GroupWise 5 supports a variety of gateways to link to multiple platforms and systems. And, by using the GroupWise 5-to-GroupWise 4 message conversion built into the MTA, you can upgrade to new versions of the gateways as they are released. New versions of the gateways were not available for this evaluation.

The only stated requirement for running GroupWise 5 is NDS running on one

NetWare 4.1 server anywhere on your network. As Novell develops versions of NDS for other platforms, a NetWare server will no longer be a necessity.

The NetWare agents installed easily and required no special attention to run. As the Setup Wizard gathers information about your domains and post offices, it automatically creates the configuration files that each agent needs and saves them in the server's System directory. In addition, it creates a script file to make starting the agents a one-command process. Domains and post offices can be on any version of NetWare 4.X and 3.X.

Setting up the NT agents was just as straightforward. The agents can be installed to either a file server directory or to a local disk. For our testing, the agents were installed locally on Windows NT Workstation 4.0. The screens look similar to the NLM screens, except that menus are available via mouse clicks instead of via function keys.

Both the NLM and NT agents were stable, even in this beta release. While we couldn't re-create the volume of our 4,000+-user production system, we encountered no server crashes and could perform maintenance without incident.

Agents for other platforms are in development. Three to five months after initial release, Novell says agents will be available for SCO Unix, HP/UX, AIX, Sun Solaris and OS/2.

#### A new face

One of the most prominent additions to the GroupWise package is the arrival of a 32-bit client. It is written for Windows 95, but Novell says it will be supported as a Windows NT 4.0 client by release date.

What grabs your attention first is the multipaned appearance of the client, similar to that of Lotus Notes and Microsoft Exchange (see Figure 2, page 113). It juxtaposes folders and hierarchical structures with content and items. A third pane containing the Quick Viewer, a means of browsing your information, can be opened along the bottom.

Novell has expanded on the universal in-box concept by adding a few new features and enhancing current ones.

The Mailbox, called the In Box in the previous release, is still the common entry point through which all items reach the user. Also, just as with the previous version, all items sent by the user are stored in the Sent Items folder, formerly known as the Out Box. The functionality of the Calendar and Task List folders remain consistent enough for veteran users to pick up where they left off with the previous version.

Also, the Trash is now simply another folder. As with previous versions, the Mailbox, Trash and now the Calendar icons each change to reflect new items that require the user's attention.

The Cabinet, which is the default location of the unlimited number of folders users can tailor to their needs, gives you a tremendous amount of flexibility in organizing your data. You can use rules to automatically move inbound items from the Mailbox to alternate locations. While you cannot make subfolders for standard

items such as Mailbox and Calendar, you can add folders to the top level of your post office box and nest folders however you wish. A Work In Progress folder is available to save draft messages.

A powerful new feature in GroupWise 5 is shared folders, a feature also found in Microsoft Exchange. Without help from the administrator, users can share folders and their contents with other users (see Figure 3). If the user exists on another post office, replication of the items occurs behind the scenes. The right to read a folder is implied, but you may also grant the right to add to, modify or delete what is already in the folder. Once you've done this, a dialog box asks for a message to be sent as an invitation to the user you've designated. When the recipient reads and accepts the invitation, a folder is created in his Cabinet and sharing is immediately activated.

Shared folders are a prerequisite for discussions, which are basically threaded online conversations. Message threads can be expanded and collapsed to make it easier to find a particular thread of interest. Formatting the text seems to be rather crude — no hard returns, no tabs and no addition of white space — but the functionality of a bulletin board feature is a welcome addition. As with all GroupWise message types, you can attach files to a discussion item.

E-mail in any folder can also be viewed as threads. By default, GroupWise shows messages you have sent, denoted by red arrows, interspersed with the messages you have received. If you do not wish to see your outbound messages, you can simply click off that filter in the toolbar.

For a look at what other beta testers had to say about GroupWise, and a list of GroupWise gateway offerings, enter this number in the DocFinder box.

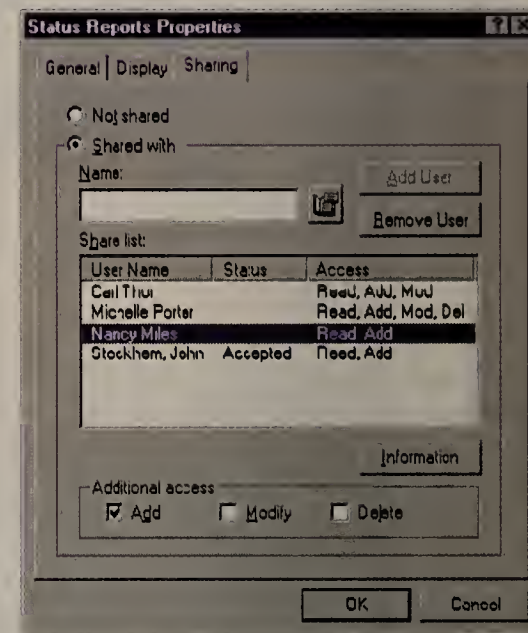


The address book in GroupWise 5 has taken on a completely different look. Integrated within previous versions, it is now a separate executable program that can be browsed or called while addressing messages. A nice feature of the Address Book is the Frequent Contacts book. As each message is sent or received, its address is picked out and placed in the Frequent Contacts book. You can use this book, sorted by number of contacts, just as any other.

To find a name, just start typing in one of the destination fields; the client looks for matches based upon which field you're typing in. It first searches Frequent Contacts, then the user's personal address book, and finally the system address book, containing all GroupWise users. Once an address is selected, it is displayed by showing the person's full name rather than some cryptic form of address. As before, you can logically combine users into groups, but you now can save these

groups in any of your personal address books.

The ability to find a piece of information in an ever-expanding mailbox is always a challenge. With GroupWise 5, you can use the Find tool to locate a text string in any message type. The Find options allow the user to selectively control which folders to search, what message



**Figure 3:** To share folders, you specify users and their access rights. An information button brings up additional data on the person highlighted.

types to look for, and even specific information about the author, delivery date or version. This is quite a handy feature for those who don't clean their mailbox as often as they should.

Workflow is a new addition to the GroupWise suite, though it was not available in the beta version we tested. Workflow is designed to automate processes — messages can be forwarded to the appropriate personnel, actions can be triggered based on the type of message or its content, and the progress of the entire procedure can be tracked and monitored.

Novell has also folded its SoftSolutions document management product into this version of GroupWise. Any program that can take advantage of Open Document Management APIs can tie into the Document Management features of GroupWise 5. Other documents can be manually merged into your post office box. Once you've done this, you can check documents out to others, keep track of revisions and the history of a document, and control how and whether people can access the document concurrently. To set up document management, an administrator must define at least one library. A library is an area where documents are stored when not checked out to a user. Documents are encoded when checked in to the library — an added security bonus.

When someone makes a request to check out a document, it is copied from the library to a directory the user specifies. If you attempt to check out the same document, you'll be informed as to who has already checked it out.

#### Wise but quirky

With all the improvements on the server side, Novell might be excused for devoting less effort to enhancing its clients. But happily, that doesn't appear to

## HOW WE DID IT

We installed GroupWise 5 on a Tangent P-90 server running NetWare 4.10 with 128M bytes of RAM and 2G bytes of disk space. Our clients ran:

- NT Workstation 4.0 on a Microtech P-90 with 32M bytes of RAM
- DOS 6.22 and Windows 3.11 on two clients, a Microtech P-90 with 32M bytes of RAM and a Zenith Z-Station 486/DX33 with 12M bytes of RAM
- Windows 95 workstations on two clients, a Microtech P-90 with 16M bytes of RAM and a Microtech 486/DX2 66 with 16M bytes of RAM

We installed the message stores and NetWare Loadable Module agents on the NetWare 4.1 server. We installed the NT agents on the NT Workstation client.

To put the product through its paces, we performed basic day-to-day functions: creating E-mail, scheduling calendar events, noting tasks and making notes. We also created documents to share and check out. On the administration side, we added and deleted users and performed database and library maintenance.



be the case.

The Windows 95 32-bit client is a feature-rich tool, but we question some of the design choices. For example, those who create regularly scheduled appointments using the Auto-Date feature might be confused by the behavior of the Set Alarm action. If you remember to set the alarm before going into Auto-Date, the result is what you would expect: each event will have an alarm set on it. But if you try to select Set Alarm after you have used the Auto-Date, the option is grayed out, and no event gets an alarm associated with it.

Another potential "gotcha" is that the Quick Viewer marks items as opened. So if you thumb down through your In Box with the Quick Viewer, the messages you pass are marked as read whether you actually opened them or not. If you do not know about this feature, you might overlook a mail message that is actually new.

The 16-bit Windows 3.1 client has changed little since Version 4.1a. It cannot take advantage of most of the features added to the 32-bit client except for client/server connectivity. This was not an oversight on Novell's part. In fact, after considering Novell's recommended upgrade path, it makes the job of moving to GroupWise 5 a much more manageable task.

When the post office is upgraded from Version 4 to Version 5, the 16-bit client, which also runs under Windows 95, is delivered automatically to the desktop. This lets the users begin using GroupWise 5 immediately in an environment they are familiar with. Users can then migrate to a full-featured 32-bit client whenever it is convenient.

Novell plans to provide a version of the 32-bit client that runs under Windows 3.1 with Win32's extensions about two to four months after the initial release. This will give users the power of a 32-bit client without forcing them into a new operating system.

There's also a full-featured Macintosh client for both Motorola and PowerMac architectures available with the initial release of GroupWise 5. The initial beta version was unavailable for review, but the client is reported to be similar to the Windows 95 client. Migrating in the Macintosh environment will be more of a plunge because there will not be an older-looking client compatible with GroupWise 5, unless users are running the remote client.

Two to four months after initial release, and not currently even in beta, Novell expects to release clients for AIX, HP/UX and Solaris.

The one client not available in GroupWise 5 that was present in Version 4.1 is a DOS client.

#### Into the spotlight

The decision to upgrade from previous versions to GroupWise 5 is all but a foregone conclusion. The new 32-bit clients pack the power of document management, sharing and workflows. Administration is now easier, more flexible and more configurable. Client/server connections and MAPI 1.0 compliance provide more options to get to your information, and

shared folders make it easy to share that information. The wide variety of platforms supported ensures that everyone can join in the fun.

Even if you are not a current user of GroupWise, you should consider it as your primary groupware platform. It offers an enticing superset of the functions of Microsoft Exchange and overlaps largely with the capabilities of Lotus Notes, though with simpler administration.

The alliance is a cooperative of users, consultants, educators and integrators that applies its technical and business skills to analyze and compare strategic network products. A list of alliance partners can be found on page 87.



*Berkley is a Certified Novell Engineer and supervisor of LAN support services at the University of Kansas, where he is chief administrator of the university's 4,000+ user GroupWise implementation. He can be reached via E-mail at [berkley@ukans.edu](mailto:berkley@ukans.edu).*



# Come with us ...

#### Want to plug into ATM right now?

Then welcome aboard! Cellware Broadband specializes in ATM access products. We believe in the destiny of ATM and won't rest until it's in every workplace and home.

For over five years, Cellware Broadband has helped make ATM the clear choice for forward-thinking people everywhere. We're bringing products to market that really perform and are compatible with systems already in place.

Profit from our experience with ATM applications like telephony and interactive multimedia. Our international team uses the most modern software tools to develop and support new products that keep pace with the growing capabilities of the Internet. We take pride in tackling demanding, difficult projects and coming up with straightforward responses.

cellware  broadband

#### Showing the way to ATM.\*

For starters, contact us for free copies of our *Company Profile* and *Pocket Guide to ATM*:  
Email [info@cellware.de](mailto:info@cellware.de)  
Phone 908 919 1462 (USA)  
(+49 30) 46 70 82-0 (International)  
or visit us at <http://www.cellware.de>  
for a host of information.

© Cellware Broadband 1996

Circle Reader Service #77



I T ' S   R E A L   S I M P L E

# 3 Networks.

One plug to the LAN. One plug to the power supply. One fully integrated, NOS-independent storage solution that lets you add any type or any amount of network storage at any time. And all in less than 15 minutes.

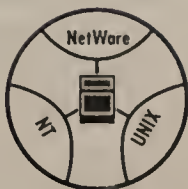
A fraction of the cost of a traditional server, SPANStor™ eliminates the need for separate NFS, NT and NetWare storage solutions. Everyone shares the increased storage space. And because the SPANStor family supports all common device types, you can add whatever you need—hard disks, optical drives and jukeboxes, CD-ROMs or RAID.

If you're migrating from one NOS to another, SPANStor is the single storage solution that can take you there. SPANStor solves your storage problems without any shutdowns or modifications of your existing server. And the fact that you can put SPANStor anywhere on your Ethernet network makes it ideal for remote sites, dedicated workgroups, disaster recovery, application centralization, near-line archiving and more.

Optimize every aspect of your network storage. Choose the one truly open, scalable and affordable storage platform. **Call Network Storage Solutions today and ask about SPANStor. 800-532-2224. [www.nssolutions.com](http://www.nssolutions.com).**



*Network Storage  
Solutions, Inc.*



**FILE SHARING**



**REMOTE SITE**



**SERVER OPTIMIZATION**



**DISASTER RECOVERY**

SPANStor is a trademark of Network Storage Solutions, Inc. Windows NT is a registered trademark of Microsoft Corporation. NetWare is a registered trademark of Novell, Inc.



# 1 Storage Platform.

*"It's incredible.  
In 15 minutes, I can add  
storage to my NFS, NT  
and NetWare® networks with  
absolutely no downtime!"*

*- - Scott Semmler, Network Manager, Network Imaging Corporation*



**SPANStor™**  
**NOS-Independent**  
**Network Storage**

**800-532-2224, [www.nssolutions.com](http://www.nssolutions.com)**



**HIGH AVAILABILITY**



**RAID**



**APPLICATION CENTRALIZATION**



**NEAR-LINE ARCHIVING**



PHOTOGRAPHS



ADSL and its cousins  
speed limit over

# Cranking it up

By Kieran Taylor

When it comes to tying in remote users, it's understandable if you scoff at the latest high-speed technologies such as ATM and frame relay. The core of carrier networks may be built on multimegabit pipes, but most small offices and remote users are relegated to slowly sipping that ocean of bandwidth through a straw. Well, that straw is about to become a water main.

Beginning early next year, carriers will begin to aggressively market various Digital Subscriber Line options. Asymmetric Digital Subscriber Line (ADSL) has been getting the most attention of late, but it will be joined by Symmetric DSL (SDSL), Rate Adaptive DSL (RADSL) and Very high-speed DSL (VDSL) services. Another iteration, High-speed DSL (HDSL), is already in use for provisioning T-1 and E-1 lines but is being modified to function as an access technology.

Although these technologies are just unfamiliar acronyms today, they could supplant tried-and-true access technologies for specific applications. Simply put, ADSL and its DSL cousins use spectrum on ordinary copper phone lines currently unused in basic telephone service, which employs lower frequencies.

When an ADSL modem is placed on each end of a copper phone line, three information channels are created: a high-speed downstream channel, typically used for transmissions to the user; a lower speed duplex channel; and the same plain old telephone service (POTS) channel ordinarily carried across copper phone lines. The high-speed channel ranges from 1.5M to 8M bit/sec, whereas

duplex rates range from 16K to 1M bit/sec, each depending on loop length and quality.

One of ADSL's biggest advantages over analog modems, ISDN and HDSL is that it provides support for POTS without any impact on data throughput. The reason is that ADSL uses frequency-division technology, enabling the POTS channel to be split off from the other two channels. This

guarantees uninterrupted POTS even if power to the ADSL modem fails. This life-line support for POTS communications is not found in most competing solutions, including ISDN and HDSL, which can furnish telephone connections but do so by consuming 64K bit/sec of bandwidth.

## A battlefield forms

All the various DSL technologies will

### NYNEX

**Service skinny:** In August, NYNEX announced a 50-line trial of Internet access and work-at-home applications with Lotus software designers and developers in the Boston area. The carrier is using Westell FlexCap modems configured to run at 1.5M bit/sec downstream and 64K bit/sec upstream, simultaneously supporting data and voice. From the trial, NYNEX says it hopes to develop services to support work-at-home applications, corporate intranet construction and residential/business Internet access.

**Pricing and availability:** None yet announced.

### PACIFIC BELL

**Service skinny:** Last month, Pacific Bell began a trial in San Ramon, Calif., involving 12 ADSL lines and Westell FlexCap modems. Initially, the modems were configured to support 1.5M bit/sec downstream and 64K bit/sec upstream links, but PacBell says they will be upgraded in the near future to support higher upstream rates to handle the demands of Internet traffic.

Westell will also supply multiplexing equipment and software to provide a gateway to the Internet from PacBell's central office. PacBell says the second phase of the trial, to begin in November, will involve testing other vendors' multiplexers. At that stage, the trial will be expanded to about 100 customers.

**Pricing and availability:** Pricing has not been announced, but PacBell says it plans to offer ADSL services to consumers in a limited area in the spring of 1997, followed by a larger launch midyear.

### BELL ATLANTIC

**Service skinny:** A 100-line ADSL technical trial for Internet access began in June and was upgraded to market trial status in August when 500 lines were added. The trial relies on Westell's FlexCap modems. It's expected that Bell Atlantic will use data-based ADSL to create Internet access and remote LAN access packages for business and consumer use.

In addition, a 600-line Internet access trial is underway in Fairfax County, Va., along with a 1,000-line video-on-demand trial called Stargazer. Bell Atlantic estimates nearly 2,000 households are active participants in these trials and has stated that it hopes to market commercially available data and video services to over 20,000 residences in the second quarter of 1997.

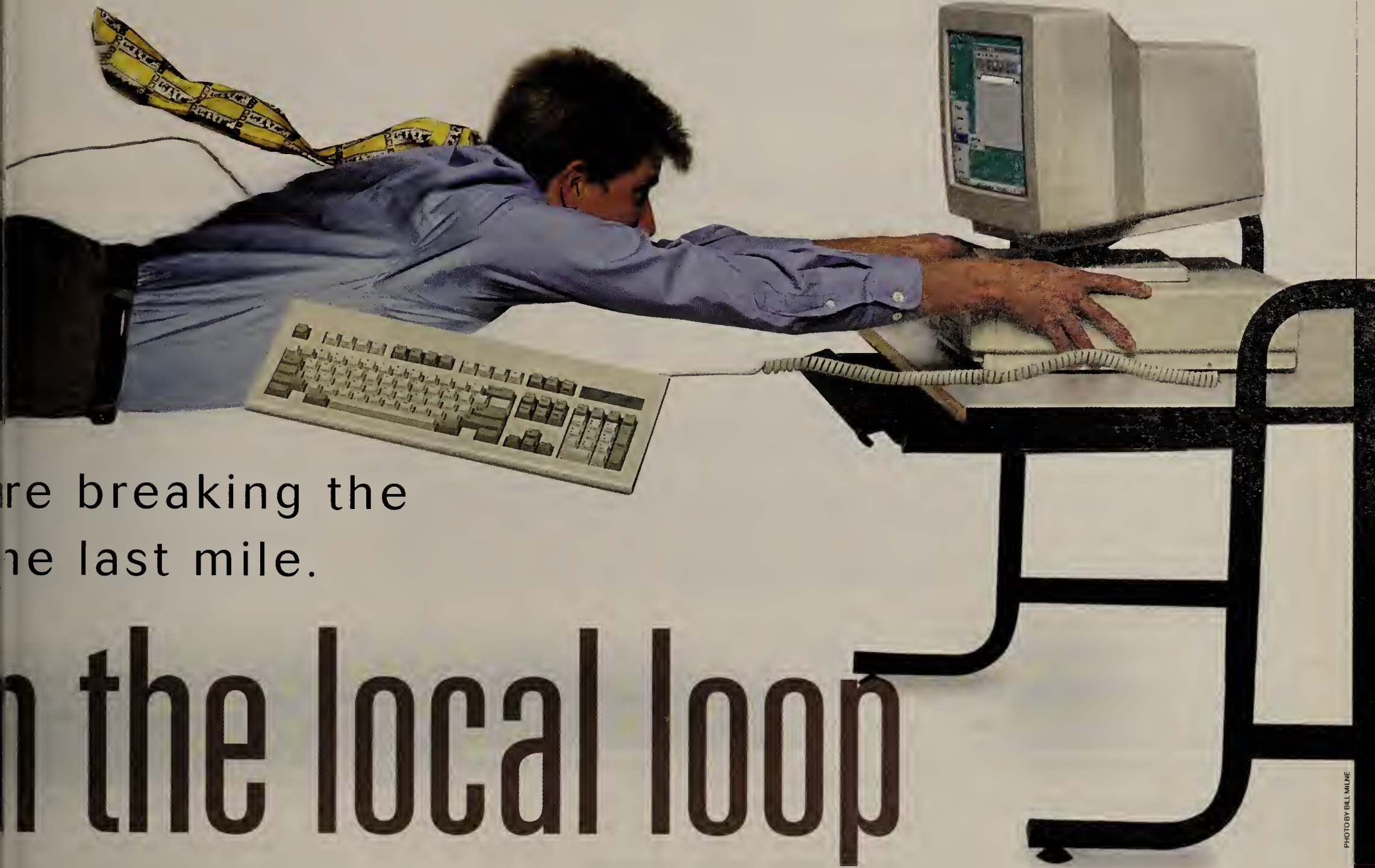
**Pricing and availability:** Although specific pricing has not been firmly set for data access or Internet services, Bell Atlantic has stated that prices in the range of \$30 to \$50 per month are not out of line. Availability is scheduled for the first half of 1997.

### US WEST

**Service skinny:** A 20-line trial is under way in Boulder, Colo., as well as a 120-line pilot in St. Paul/Minneapolis, both using FlexCap modems from Westell and HDSL modems from PairGain. The focus is on video-on-demand applications, Internet access and remote LAN access.

**Pricing and availability:** Services are expected in the first quarter of 1997 at \$50 to \$100 a month.





re breaking the  
ne last mile.

# In the local loop

PHOTO BY BILL MILNE

compete with existing offerings, most notably ISDN Basic Rate Interface and analog modems. Carriers and equipment vendors are at work on improvements that will boost the capacity of the older technologies, but DSL is likely to relegate each of them to niche applications, albeit not overnight.

"The new and old access technologies are definitely going to coexist. There's a

need for analog modems and Basic Rate ISDN because there's a huge installed base to support," says Joe Glynn, director of network design for US WEST, Inc. Glynn points out that these local-loop approaches are now tried-and-true options, and many network managers have invested in communications servers that support critical analog dial-up and ISDN BRI connectivity.

However, Glynn expects customers will eventually change their tune. "I don't expect a rapid change, but customers will begin looking at DSL in the coming years for applications like LAN interconnect as well as Internet access," he says.

Both of these applications are asymmetric in nature, demanding a multimegabit downstream delivery to the user and a slower upstream link into the network to

transmit basic commands — exactly what ADSL provides. Glynn envisions the connection of routers to external DSL bit-pumps that will furnish connections far faster than today's T-1 frame relay links. These connections will likely support frame relay or ATM traffic.

"When the power consumption of DSL chipsets drops, you may even see that DSL function integrated into routers or other edge devices," Glynn adds.

Most regional Bell operating companies are trialing ADSL, and most will have service offerings in mid-1997. Initially, they will be in major cities where there is the potential for increased take-up rates. Large-scale deployments to more remote areas will likely come in 1998.

## Assessing access options

In the meantime, most remote networkers have to use more commonly available access methods. The most ubiquitous and inexpensive of the options is the analog modem. While its speeds (usually 14.4K or 28.8K bit/sec) can leave some seasoned World-Wide Web slingers wanting, it has two factors on its side.

First, even the latest modems can cost as little as \$200. When compared to any other technology, the analog modem is the only solution truly within the reach of the average consumer. And unlike any other option, it doesn't require any modi-

### AMERITECH

**Service skinny:** A six-month ADSL trial conducted in conjunction with IBM is to begin next month with about 200 Chicago-area customers. The trial will involve a data access service with upload and download speeds up to 1.5M bit/sec using Westell ADSL modems. Trials testing ADSL interoperability with other switching platforms, such as ATM, are planned for an unspecified later time.

**Pricing and availability:** None yet announced.

### GTE

**Service skinny:** In February, GTE began a six-month trial of ADSL data and Internet access in the Ft. Worth, Texas, area. Approximately 30 lines were deployed for participants, including the Irving Public Library System, ProTech Books (a sister company of Taylor's Bookstores), The Internet Store and area GTE employees. The trial's goal is to place the technology in the hands of consumers frequenting those stores who may be likely to buy high-speed Internet access. In July, GTE added two Circuit City stores to the trial.

In August, GTE announced a 100-line trial in Redmond, Wash., with Microsoft and GTE employees. The trial uses FlexCap modems from Westell and DMT modems from Amati. The focus is on work-at-home applications and enhancing Windows NT to support ADSL.

**Pricing and availability:** Pricing has not been disclosed, but services are expected in the first half of 1997.

### SBC COMMUNICATIONS

**Service skinny:** Although SBC has not made any public announcements to date, sources within the company confirm the carrier is trialing ADSL in Houston with 50 Shell Oil employees who are using it for high-speed, interactive remote LAN access. Sources would not disclose the names of vendors in its test, but said the trial involves over 50 lines running with 6M bit/sec downstream channels and a 640K bit/sec duplex channel. The higher throughput rates are necessary because the type of remote data access applications in use involve moving extremely large files of data, possibly CAD/CAM files.

A separate and smaller technical trial involves a few lines running at 1.5M bit/sec downstream and 64K bit/sec upstream. Sources indicate additional corporate trials will be announced in the coming months but that consumer-based trials won't occur until mid-1997.

**Pricing and availability:** None yet announced.

### BELL SOUTH

**Service skinny:** Trials are limited to video-on-demand pilots in Chamblee, Ga., which began in late 1995 and early 1996. Although the number of lines has not been disclosed, it is estimated that approximately 30 employees are involved in the test, which uses DMT-based modems from Orckit Communications. The modems are configured to run at 6M bit/sec downstream.

**Pricing and availability:** None yet announced.



fications to service provider's central office (CO) equipment — making it the only option for anytime, anywhere network access.

While connection speeds vary, nearly every RBOC will condition phone lines to enhance modem connection speeds. And the recent addendum to V.34, the current International Telecommunications Union modem specification, will enable connections up to 33.6K bit/sec. While that's a fraction of the speeds DSL can offer, with V.42bis compression enabled, users can achieve throughput of 115.2K bit/sec or more.

These speeds are enough for basic Internet surfing, E-mail transmission and small file transfers. But the days of analog modem access are numbered as users demand improved access speeds to the Internet and corporate resources.

"There will absolutely be a decline in the use of analog modems beginning in 1998," says Flynn Nogueira, manager of the ADSL program office at GTE Telephone Operations in Irving, Texas. "There's a good chunk of users on the Internet who are frustrated with slow speeds, and it won't take much at all to push them to ISDN or ADSL."

#### ISDN vs. ADSL

When it comes to a question of ADSL vs. ISDN, Nogueira says the two technologies are complementary and suited to different applications. GTE is aggressively marketing ISDN today and is conducting two ADSL trials. The first, in Irving, is targeted at businesses. The other is in Redmond, Wash., where Microsoft Corp. employees are helping fine-tune ADSL and Microsoft software to support work-at-home applications — the same market ISDN targets today.

While the results of those trials are still being tabulated, Nogueira points out that ADSL offers a permanent packet-switched connection, while ISDN is circuit-switched, much like voice, and offers guaranteed bandwidth.

Use of the Multilink PPP enables users to inverse-multiplex the two B channels of a BRI link to support a 128K bit/sec connection. With the compression schemes found on most access servers such as the Ascend MAX, throughput can go as high as 512K bit/sec.

The more expensive ISDN Primary Rate Interface — it averages about \$1,300 per month — offers 23 B channels and one control channel, producing an aggregate rate of 1.544M bit/sec.

BRI's 128K bit/sec is enough to support applications such as videoconferencing that require the deterministic bandwidth circuit switching provides. The much higher speed ADSL is suited to support data applications, such as file transfer, Internet access and E-mail transmission, where latency is not a concern.

If you need to support a large number of simultaneous voice and data transmissions, you will likely rely on ISDN PRI as the technology of choice for some time. Unlike ADSL systems, equipment such as PBXs that support PRI can individually route as many as 23 incoming voice or data calls to appropriate endstations.

#### COMPARISON OF VARIOUS xDSL TECHNOLOGIES

	ISDN	Single pair HDSL	CAP ADSL (current)	CAP ADSL (October '96 revision)	DMT ADSL (Current)	DMT ADSL (October '96 revision)	VDSL	Analog modem
<b>Downlink speed</b>	128K bit/sec	768K bit/sec	1.5M bit/sec	7M bit/sec	6M bit/sec	8M bit/sec	51M bit/sec	33.6K bit/sec
<b>Uplink speed</b>	128K bit/sec	768K bit/sec	64K bit/sec	1K bit/sec	640K bit/sec	1M bit/sec	1.6M-2.3 bit/sec Video on demand	
<b>Major applications</b>	<ul style="list-style-type: none"> <li>Internet access</li> <li>Transparent LAN services</li> </ul>	<ul style="list-style-type: none"> <li>Internet access</li> <li>Transparent LAN services</li> <li>Video conferencing</li> </ul>	Internet access	<ul style="list-style-type: none"> <li>Internet access</li> <li>Video on demand</li> </ul>	Internet access	<ul style="list-style-type: none"> <li>Internet access</li> <li>Video on demand</li> </ul>		Internet access
<b>Reach with 24 gauge wire</b>	18,000 feet	12,000 feet	18,000 feet	12,000 feet	12,000 feet	12,000 feet	1,000 feet	Not applicable
<b>Simultaneous POTS over same pair</b>	Yes, digital delivery	Yes, optional by digital timeslot, line powered	Yes, analog baseband	Yes, analog baseband	Yes, analog baseband	Yes, analog baseband	Yes, analog baseband	Yes, optional digital delivery
<b>Carrier deployment status and issues</b>	<ul style="list-style-type: none"> <li>Approx. 400,000 lines deployed in N.A.</li> <li>90% of wire centers ready (requires CO switch upgrade)</li> </ul>	<ul style="list-style-type: none"> <li>Approx. 200,000 two-pair lines deployed in N.A.</li> <li>80% of customers within reach</li> <li>Uses commercial hubs and routers in CO</li> </ul>	<ul style="list-style-type: none"> <li>Trials under way</li> <li>90% of customers within reach</li> <li>Uses commercial hubs and routers in CO</li> </ul>	<ul style="list-style-type: none"> <li>Small trials starting</li> <li>80% of customers within reach</li> <li>Uses commercial hubs and routers in CO</li> </ul>	<ul style="list-style-type: none"> <li>Trials under way</li> <li>90% of customers within reach</li> <li>Uses commercial hubs and routers in CO</li> </ul>	<ul style="list-style-type: none"> <li>Small trials starting</li> <li>80% of customers within reach</li> <li>Uses commercial hubs and routers in CO</li> </ul>	<ul style="list-style-type: none"> <li>Not yet available</li> <li>Deployment issues yet to be determined</li> </ul>	Ubiquitous deployment
<b>Availability volume</b>	Today	Today	Early 1997	Mid-1997	Early 1997	Late 1997	Late 1998	Now

While ISDN PRI will own that niche, ADSL and ISDN BRI will overlap one another when it comes to provisioning high-speed data access to small businesses and individuals.

Here at TeleChoice, Inc., we estimate there will be more than 10 times as many ISDN BRI lines as ADSL lines at the close of 1996. It's estimated that about 500,000 ISDN BRI lines are currently installed, and that number is on the rise. That means carriers will likely continue to support and market the service even while they bring up their first ADSL lines.

Another factor to consider is that, initially, ADSL connections will cost about \$2,000 per line to bring up. Although that number should drop dramatically, it will be a factor in early deployments.

Currently, the ADSL modem at the customer premises connects via ordinary phone wire to an ADSL modem, or a rack of such modems, at the telephone company CO. From there, it is handed off to an Ethernet switch, a router or an ATM switch that furnishes a connection to the Internet or another data network. Several vendors are at work on DSL Access Multiplexers that will integrate that functionality, but delivery is not expected until year-end. Such devices and improvements in modem design could lower the per-line price of ADSL deployment to about \$500 by mid-1997.

Several current carrier requests for proposals stipulate price points in that ballpark. If they are met, carriers should be able to offer ADSL services at a cost of about \$50 or less per month.

Once those prices are realized in 1998, TeleChoice predicts ADSL line deployment will take off so fast that by the end of that year, ADSL lines will number half that of ISDN BRI lines installed. Given ISDN's track record, those predictions may be hard to swallow. But ISDN and ADSL dif-

fer greatly in terms of service deployment.

ISDN typically requires costly software upgrades or replacement of CO voice switching equipment. Because the cost of these upgrades is amortized across a large number of users, telephone companies typically wait for significant demand prior to deployment of ISDN services. In other words, if you live in rural areas, you're left waiting.

**Find it on Fusion**  
TeleChoice has assembled a boatload of info on ADSL, from white papers to upcoming conferences and even a news archive. Access via Network World Fusion by typing 9609 in the DocFinder box on the home page.

Network World Fusion  
<http://www.nwfusion.com>

ADSL, by contrast, can be deployed without a large initial capital outlay. Rather than amortizing a large switch, telephone companies only need to recoup the investment of ADSL modems and some data communications equipment, such as an Ethernet hub and a router. Because users can be added incrementally by simply adding modems, ADSL services can be offered in rural areas without significant capital expenditure. What's more, modems can be relocated as needed when subscribers discontinue use of ADSL services.

There's no question that ADSL and ISDN will be aimed at the same markets: Internet access and telecommuting. While ISDN BRI's 128K bit/sec fills the bill today, the increased use of streaming video and audio applications on the Internet and in businesses will make BRI an

inadequate option for power users in 1998. At 128K bit/sec, the quality of Internet phone and video applications is barely tolerable.

On the other hand, Bill Kula, manager of media relations for GTE, has witnessed trial users' enthrallment with ADSL services firsthand. "The participants have said it has exceeded their wildest dreams. They want the service and say they will nearly pay anything for it," Kula says.

Howard Maher, vice president of marketing for ProTech books and a pioneer participant in GTE's trial, can testify to ADSL's promise. ProTech has ADSL modems installed in two of its stores to provide Internet access to customers.

"The ADSL modems are so fast that many of our customers thought we were loading Web pages from a huge hidden hard drive. It's incredible," Maher says. He thinks users "will be thrilled when they can get this [ADSL] service in their homes or businesses."

Service providers are still assessing how they will package these competing access technologies. "Different technologies will be appropriate for different customer segments," GTE's Nogueira says. "Education, health and travel industries will all demand different applications. We are currently determining which technologies fit the applications at hand."

#### Other DSL flavors

ADSL developers will concede that ADSL isn't the be-all, end-all high-speed network access technology. Indeed, some vendors have already announced the availability of SDSL and RADSL solutions.

While Internet access and video-on-demand applications are asymmetric in nature, services such as videoconferencing and transparent LAN services are not.

For this reason, several vendors are likely to ship SDSL and RADSL modems



# NetworkWorld

## TECHNICAL SEMINARS

"IP is becoming the common coin of enterprise networking and understanding where IP is going is a high priority for network professionals."  
John Gallant, Editor-in-Chief, Network World

**DIRECTED AND PRESENTED BY RENOWNED INTERNETWORKING EXPERT MARK MILLER**

### Preparing for the Next Generation Internet Protocol

The next generation of Internet Protocol — IPv6 will significantly impact your TCP/IP-based inter-network. The Internet explosion now requires new functions that go beyond the capabilities of the current Internet Protocol, or IP. These include enhanced security, support for real time traffic flows and expanded addressing capabilities. The addressing issue has been one of the most significant concerns as it was predicted that the Internet community would run out of available addresses, thus limiting the growth of this critical communication resource.

In late 1990, the Internet Engineering Task Force (IETF) initiated efforts to select a successor to the IP. In late 1993, the IETF formed the Internet Protocol — Next Generation (IPng) working group, which was chartered with investigating the various proposals, and recommending a course of action. The outcome of those efforts produced what is now known as IP version 6 (IPv6), which is currently being implemented by many vendors.

Perhaps more importantly, IP is the foundation of the TCP/IP protocol suite. Therefore if IP is revised, other protocols must be changed as well. The significance of this protocol revision extends to LANs, MAN and WAN transmission systems, as well as the upper layer protocols and application programming interfaces.

Whether you are a network manager, designer or software developer, this seminar will provide you with information on the widespread ramifications of this new protocol. You will learn how to effectively plan and implement a successful, orderly transition.

# IP v6

## THE NEXT GENERATION FOR TCP/IP INTERNETWORKS

### TOPICS YOU DON'T WANT TO MISS!

✓ **Learn how the implementation of IPv6 will allow continued expansion of the global Internet**

✓ **Discover key features of IPv6, including larger addresses and security**

✓ **Learn how to strategically plan your transition from IPv4 to IPv6**

### KEY BENEFITS OF ATTENDING

- Understand the limitations of the current Internet Protocol — IPv4
- Learn details of the proposed IPng solutions: CATNIP, TUBA and SIPP
- Understand the key functional and protocol enhancements incorporated into IPv6
- Analyze the formats of the IPv6 packet header, extension headers, ICMPv6 messages, Neighbor Discovery messages and others
- Gain detailed insights into how the IPv6 transition will affect other protocols, such as Ethernet, token ring, RIP and OSPF
- Explore the effects of IPv6 on other elements of your internet or intranet architecture
- Learn how leading vendors such as Bay Networks, Cisco Systems, Digital, FTP Software, Sun and others are implementing IPv6
- Discover how to obtain public domain sources of further information on IPv6

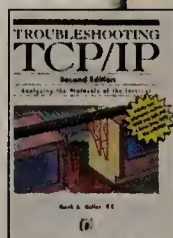
### 1996 LOCATIONS AND DATES

Chicago, IL	September 26	Boston, MA	November 8
Washington, DC	October 10	Irvine, CA	December 3
Denver, CO	October 16	San Francisco, CA	December 4
Atlanta, GA	October 24	New York, NY	December 10
Dallas, TX	October 25	Philadelphia, PA	December 11

If you are interested in sponsoring this event, please call 508-820-7520.

### REGISTER AND YOU WILL RECEIVE . . .

- Comprehensive Seminar Workbook
- Copy of *Troubleshooting TCP/IP*, 2nd Edition, by Mark A. Miller, P.E.
- Exclusive Protocol Reference Guides: TCP/IP, IPv6 and OSPF
- CD containing over 1,000 Internet RFC, FYI and STD reference documents
- Luncheon and break refreshments
- All of the above included in your \$450 registration fee



Note: If you can't attend, a full attendee kit is available for just \$99.95!

### Web/E-Mail Information

Obtain full seminar information and register on-line in the Professional Development Group section on our Web site at:  
**www.nwwfusion.com**

OR

receive full seminar information via e-mail by sending a request to:  
**seminars@nww.com**

Please put the word "IP" in the subject field.

Call **1-800-643-4668**

**Register today for the seminar nearest you!**

Dial Our **FAX-BACK** Information Line at  
**1-800-756-9430**

for a complete seminar outline and registration form.  
When prompted, request document #60.

**Official Sponsors**

**digital**



Bay Networks



in the fourth quarter of 1997. These solutions will boost upstream rates to support applications that demand more symmetrical transmissions.

Both SDSL and RADSL can be considered enhanced versions of ADSL. Similar line codes are employed, but software is tweaked such that the speed of the channels can be enhanced to support certain applications. Like ADSL, these technologies support simultaneous POTS.

While ADSL can currently reach top downstream rates of more than 8M bit/sec, several vendors have already identified the need for more speed over shorter distances — particularly for video distribution. Hybrid Fiber Coax is the usual contender for offering very high-speed services to the home, but some telephone companies lacking installed fiber or coaxial cable are looking for solutions that run over copper. The focus here

appears to be solely residential with some obvious work-at-home implications.

VDSL is one such technology likely to play in this space. It transmits high-speed data over short reaches of twisted-pair copper telephone lines, with a range of speeds depending on actual line length between the customer premises and switching equipment. The use of fiber-enabled curbside switching systems is likely to keep those lines short.

The maximum downstream rate for VDSL is between 51M and 55M bit/sec over lines up to 1,000 feet (300 meters) in length. When lengths go beyond 4,000 feet (1,500 meters), the rate averages 13M bit/sec. While these distances are short in comparison with the loop lengths supported by ADSL, it's important to remember that these lines will likely be used in conjunction with the deployment of fiber to the curb.

Like ADSL, early VDSL implementations are asymmetric and offer upstream speeds from 1.6M to 2.3M bit/sec. Analog POTS support will also be possible because the frequency bands used for voice and digital transmission are separate. There is no standard for VDSL yet. It's likely to be well over a year before production VDSL units are available.

#### DSL domination?

DSL is likely to garner a significant por

### Competing specs vie for ADSL pie

**W**hen it comes to Asymmetric Digital Subscriber Line (ADSL) deployment, the industry is in somewhat of a quandary over two competing approaches. The first is called discrete multitone (DMT), the second, carrierless amplitude and phase (CAP) modulation. Both will offer downstream rates in excess of 6M bit/sec and simultaneous duplex transmissions of 640K bit/sec or more over single-pair copper lines of 12,000 feet or less.

The ANSI Working Group T1E1.4 has approved DMT as an ADSL standard (ANSI Standard T1.413). The European Technical Standards Institute also contributed an Annex to T1.413 to reflect European requirements. CAP is vying for inclusion in this standard — it is currently a de facto standard produced by the former licensing division of AT&T Paradyne, now dubbed GlobeSpan Technologies, Inc. Although CAP does not enjoy standards status, it is deployed in most ADSL trials. This state of affairs could lead to the creation of a double standard, but both sides are working to avoid this scenario.

DMT divides the 1-MHz spectrum offered by a phone line into 256 4-kHz channels. It then varies the bit densities on each channel to overcome noise and interference that may be present in sections of that spectrum. Proponents of DMT argue it is better on noisy lines because it has the ability to maximize throughput on good channels and minimize use of those with heavy interference. In contrast, CAP relies on a single channel and uses techniques similar to the Quadrature Amplitude Modulation used in V.34 modems, relying on a combination of amplitude modulation and phase shifts to increase line capacity.

— Kieran Taylor

## Join Interphase at

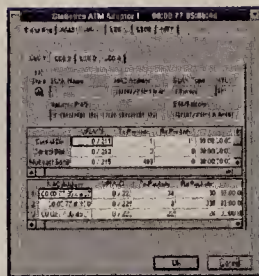
**NETWORLD+INTEROP**

*... and see today's hottest connectivity products for ATM, ISDN, FDDI, Fibre Channel and Fast Ethernet.*

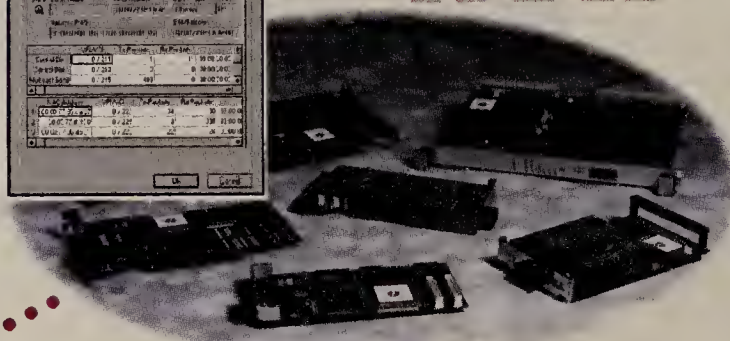


**Booth 5158**

Interphase offers one of the industry's most comprehensive lines of ATM adapters. In addition to finding out about our complete line of 155Mbps and 25Mbps ATM adapters, we invite you to see a demonstration of CellView™, the industry's easiest and most powerful graphical configuration management tool for ATM adapter set-up.



**ATM**



**ISDN**

With our recent acquisition of Synaptel, a leading manufacturer of ISDN connectivity products,

Interphase is pleased to offer a comprehensive line of remote access adapters for desktop and server platforms. Join us to find out about the highly acclaimed Syncard Series of ISDN adapters.



**Fibre Channel**

Fibre Channel is the next generation mass storage technology. Visit with Interphase and learn how Fibre Channel can be utilized as a high-throughput mass storage connection and as a performance I/O attachment for Web server environments.



INTERPHASE  CORPORATION®

<http://www.iphase.com>

[fastnet@iphase.com](mailto:fastnet@iphase.com)

1-800-FASTNET

Drop by Booth # 5158 at Network + Interop Atlanta and learn more about today's hottest connectivity products from Interphase. Visit our in-booth demos and become eligible\* to win one of our popular "Networking Ned" t-shirts or our Grand Prize set of Ping Golf Clubs and golf bag.

\* Contest rules posted in booth.



# NetworkWorld

## TECHNICAL SEMINARS

### *Essentials* of **Networking** and **Data Communications** Technologies and Their Practical Application

Networks and communications systems are evolving with ever-increasing speed. Network technology options are broad in range, complex in nature and ultimately confusing. Interconnectivity is by no means a trivial issue and interoperability is still difficult to achieve.

*Essentials of Networking and Data Communications* is a dynamic, fast-paced, plain-English, common-sense and thoroughly understandable explanation of current and developing network technologies and communications systems. Acronyms are decoded, technologies are demystified, standards are put in perspective, and regulatory issues and trends are explained. The present and future "Networked World" is set in the context of meaningful and cost-effective business applications.

#### 12 BENEFITS OF ATTENDING THIS SEMINAR . . .

1. Gain a comprehensive understanding of networking and data communications
2. Understand the fundamentals of transmission systems from analog to digital, from twisted pair through fiber optics and from wired through wireless
3. Gain a thorough understanding of LANs and LAN internetworking technologies, solutions and issues
4. Comprehend the basics of data communications protocols: line set-up, coding schemes, asynchronous vs. synchronous, error detection and correction
5. Understand the evolution of data networking, from DDS and X.25, through T/E-Carrier, ISDN, SMDS, Frame Relay, ATM and B-ISDN
6. Differentiate between bridges, routers, brouters and gateways — what they do and where they fit
7. Learn the nature of current and developing infrastructure technologies, including ADSL, HDSL, SONET, Wireless Local Loop (WLL) and hybrid local loops
8. Understand the differences between circuit, packet, frame and cell switching
9. Develop an informed and meaningful strategy for the transition to Broadband Networking through SMDS, Frame Relay and ATM
10. Compare and contrast the options for wireless data networking in the LAN, MAN and WAN domains
11. Develop a sense of carrier options — LECs, CAPs/AAVs and IXC's — as well as technology alternatives
12. Develop an informed and meaningful strategy for the deployment of emerging technologies, in the context of meaningful business applications

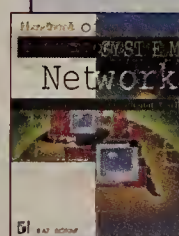
Whether you are seeking a firm foundation of networking knowledge or require a comprehensive update of current trends, this invaluable seminar will meet your networking and data communication knowledge needs by providing you with insights and a big-picture perspective of the fast-paced networking industry.

Developed and directed by Ray Horak, an internationally acclaimed network consultant, author and lecturer, this two-day seminar is informative and entertaining. Interactive case studies are interwoven throughout the day to illustrate the meaningful application of critical technologies presented.

#### 1996 & 1997 LOCATIONS AND DATES

Chicago, IL	Oct. 21-22	New York, NY	Feb. 24-25
San Jose, CA	Oct. 24-25	Atlanta, GA	Feb. 27-28
Boston, MA	Oct. 28-29	Philadelphia, PA	Mar. 17-18
Irvine, CA	Nov. 7-8	Dallas, TX	Mar. 20-21

#### REGISTER AND YOU WILL RECEIVE . . .



- Comprehensive Seminar Workbook
- Copy of newly released *Handbook of Communication Systems and Networks* by course presenter Ray Horak
- Luncheon and break refreshments
- All of the above included in your \$895 registration fee

Note: If you can't attend, call us and order this informative and useful attendee materials kit for just \$99.95!

#### Web/E-Mail Information

Obtain full seminar information and register on-line in the Professional Development Group section on our Web site at:

**www.nwfusion.com**

OR

receive full seminar information via e-mail by sending a request to:

**seminars@nww.com**

Please put the word "DATA" in the subject field.

Call **1-800-643-4668**

Register today for  
the seminar nearest you!

Dial Our **FAX-BACK** Information Line at

**1-800-756-9430**

for a complete seminar  
outline and registration form.

When prompted, request document #90.

If you are interested in an on-site presentation of this seminar, please call us.



# NetworkWorld TV

## Presents LIVE Interviews with Industry Leaders

■ Lloyd Atkinson, VP Marketing	General DataComm	September 18 - 10:20 am
■ Peter Auditore, Director of Marketing	Hummingbird Communications	September 18 - 10:35 am
■ Judy Benningson, Product Line Manager	Penril Datability Networks	September 18 - 10:50 am
■ Customer Testimonial	Cabletron	September 18 - 11:20 am
■ Tony Kelly, VP Marketing	InterCon Systems	September 18 - 11:35 am
■ Rick McGee, VP Networking Hardware	IBM	September 18 - 11:50 am
■ Rick Tinsley, VP/GM, Vivid Division	Newbridge Networks	September 18 - 12:35 pm
■ Mike Lunzer, Director, Product Management	Memotec	September 18 - 12:50 pm
■ Michael Zisman, CEO	Lotus	September 18 - 1:20 pm
■ Stephen J. Clark, CEO & Guy Hoffman, COO	Openconnect Systems	September 18 - 1:50 pm
■ Rich Nortz, Sr. VP, Technical Services & Jerry Christensen, VP Marketing, Novell Education	Novell	September 18 - 2:35 pm
■ Stephen Polley, CEO	Interphase Corporation	September 18 - 2:50 pm
■ Dick Eyestone, Sr. VP, Enterprise Business Unit	Bay Networks	September 18 - 3:20 pm
■ Ray Bermond, Chairman	UniSPAN	September 18 - 3:35 pm
■ Jim Koerner, Manager, LAN Systems Brand Marketing	IBM OS/2	September 18 - 3:50 pm
■ Dave Carlton, VP Research & Development	Dynatech	September 18 - 4:20 pm
■ John Tucker, VP Sales & Marketing	ACT Networks	September 18 - 4:35 pm
■ Linda Hazzan, VP Product Management	SoftQuad	September 18 - 4:50 pm
■ Peter C. Madsen, President	FastComm Communications	September 19 - 10:20 am
■ Customer Testimonial	FastComm Communications	September 19 - 10:35 pm
■ Bill Hawe, Chief Technical Director, Digital Networking Business	Digital Equipment Corp.	September 19 - 10:50 am
■ Robert Markovich, VP Marketing	Visual Networks	September 19 - 11:20 am
■ Michael Krieger, Sr. VP Business Development	J&L/Chatcom	September 19 - 12:35 pm
■ Customer Testimonial	Fore Systems	September 19 - 12:50 pm
■ Bill Donmeyer, Industry Marketing Manager	AMP	September 19 - 1:20 pm
■ Dr. Kause Lohse, General Manager	Cellware Broadware	September 19 - 1:35 pm
■ Dr. Dennis Conti, VP North America Markets, Satellite Networks Division	Hughes Network Systems	September 19 - 2:20 pm
■ Dave Taylor, Worldwide Sales Manager	Compuware Corporation	September 19 - 2:35 pm
■ Charles S. Strauch, CEO	Pairgain Technologies	September 19 - 2:50 pm
■ Ed Kennedy, VP Marketing	Alcatel Data Networks	September 19 - 3:35 pm
■ Alan Taffel, VP Sales and Marketing	UUNET	September 19 - 4:20 pm

**See LIVE Broadcasts  
on N+1 Grand Theatre Stage,  
Convention TV or on the Internet  
at [www.interop.com](http://www.interop.com)**

\*Programming subject to change.



**NetworkWorld**



tion of the local-loop data access market in the coming years, particularly when it comes to Internet access. TeleChoice forecasts that, by 1988, more than one million ADSL lines will be installed.

But that doesn't necessarily spell the instant demise of analog modems or competing services such as ISDN. Those transports will be supported for some time because of their large installed base and the fact that they will probably always be less expensive compared to DSL options. New data customers are the likely targets for initial DSL-based services and will be guided to use various flavors of DSL depending on their application.

So you'll need to match local-loop technologies to your budget and requirements. Analog modem access will remain a viable option for mobile users because of its ubiquitous nature. It's doubtful that ISDN or ADSL will show up in hotel rooms anytime soon. Modems will also remain the cheapest of the local-loop options for casual users. The telephone companies' significant investment in ISDN will likely

mean that rates will become more competitive in the coming years. For those users that demand "casual connectivity" (six hours a day or less), ISDN will remain a cost-effective method to obtain dial-up bandwidth. It will also remain the choice for users of desktop videoconferencing and other applications that demand low latency. ISDN PRI will remain the choice for businesses handling a large number of voice and data calls. While Internet access

will represent the bulk of DSL's duties initially, that will change as more traditional networking vendors embrace the technology. When that occurs, in about a year's time, service providers will likely expand DSL offerings to meet specialized needs of corporate networkers. These services could include transparent LAN services, remote LAN access and even basic frame relay and ATM connectivity over DSL circuits as DSL interfaces begin to appear on

devices such as routers and frame relay access devices. Competing remote access solutions won't disappear overnight, but, come 1997, they'll find that the new kid in town, DSL, is gunning for its fair share of the local loop.

*Taylor is a broadband consultant at Verona, N.J.-based TeleChoice, Inc., a telecommunications consultancy specializing in xDSL consulting.*

## HDSL offers a cut-rate option

**E**xcluding ISDN, which is based on DSL technology, High-speed Digital Subscriber Line (HDSL) probably has the largest installed base of all the DSL services. HDSL got its start when carriers realized it was cheaper than using repeaters to extend T-1 and E-1 services over long copper loops. HDSL-compatible cards at the central office and the customer premise employ sophisticated modulation and line coding techniques that permit signals to travel farther.

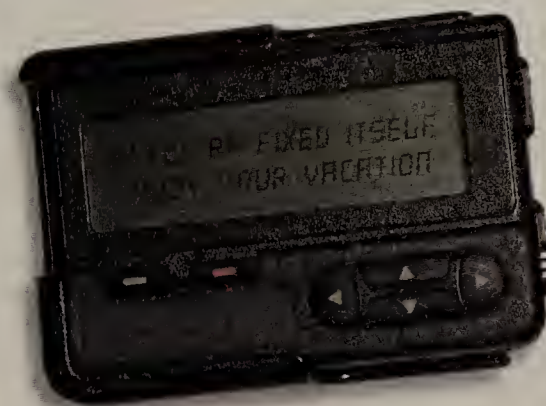
Currently, HDSL is used predominantly over two or three pairs of copper wire. This could change as vendors such as PairGain Technologies, Inc. of Tustin, Calif., with its Megabit Modem, are now shipping devices that connect over a single pair of wires. The penalty for operating over one pair is performance: Current implementations top out at either 384K or 768K bit/sec in symmetrical configurations.

Single-pair HDSL will likely be used to provide Internet and corporate LAN access over ordinary phone lines and is currently being trialed by US WEST, Inc., GTE Telephone Operations and other carriers.

At about \$1,000 per line in quantities, HDSL modems are priced at roughly half that of current ADSL solutions. Therefore, HDSL may offer providers a lower cost, albeit lower speed, service option until ADSL vendors can lower price points. However, single-pair HDSL will likely be supplanted by ADSL and Symmetric DSL for data applications eventually since those services will offer higher speeds.

—Kieran Taylor

Try getting this with any other network solution.



**O**ther network technologies alert you to trouble—after the crash. ODS network solutions actually prevent

network downtime. They can automatically detect malfunctions, fix problems and



reroute traffic. So you can finish dinner (or your vacation) in peace. One of the world's largest retailers relies on

ODS to reduce downtime and increase point-of-sale productivity. Find out how we can help you sleep at night.

**ODS**

OPTICAL DATA SYSTEMS

For full product catalog contact  
<http://www.ods.com>  
or call 214-234-6400

Come see our hubs



at booth #704

Circle Reader Service #91



# SURF'S DOWN!



Surfing the 'Net can be way cool—if you're a teenager with time to kill. But if you're a network manager who needs facts about networking equipment, cybersurfing can be an exercise in frustration. The infor-

hundreds of cutting-edge products, as well as industry studies of entire technologies, all indexed by vendor, product, and technology. What else would you expect from the networking industry's premier test lab?

<http://www.tolly.com>

mation you need is out there somewhere, but you're playing point-and-click hide and seek—and hoping you get lucky.

Relax. Now there's a single Web site that's loaded with accurate, objective assessments of the networking gear that *Fortune* 1,000 companies count on to stay competitive. Just point your browser at <http://www.tolly.com>, the home page of The Tolly Group. You'll find test results for

T H E  
**TOLLY**  
G R O U P

INDEPENDENT TEST RESULTS

**Visit The Tolly Group Web site for your free "Surf's Down" button**

Let the world know that you've got more important things to do with your time than surf the Web. Pay a quick visit to <http://www.tolly.com>, click on the "Surf's Down" icon, and register. We'll send you a "Surf's Down" button compliments of The Tolly Group.





# Management Strategies

**Covering:** Career Insights and Innovations  
in Managing Staff, Budgets and Technology

## The knowledge chief speaks

The raw data that people wade through and crunch in their workaday worlds may be maintained and distributed by an organization's technical wizards. But helping everyone to work smarter is increasingly becoming the responsibility of an emerging corps of top executives known as chief knowledge officers (CKO).

Big Six consulting firm Coopers & Lybrand has a leader in that new executive corps: Ellen Knapp. The firm's former chief

technology officer has been asked to collect and catalog the smarts of consultants worldwide into a data warehouse of what is being called intellectual assets.

Knapp recently talked with *Network World* Senior Editor Barb Cole about this new position and how she plans to spread know-how across the enterprise.

### What does a CKO do?

For [Coopers & Lybrand], my job entails all aspects of knowledge generation, both between people and between us and our clients.

As CKO, I will facilitate knowledge sharing among our 73,000 professionals, as well as between our people and client base. I will also be responsible for formulating a strategy with respect to new, knowledge-based products and services. Overall, I will look at

how we make our knowledge available through the Internet and throughout electronic communities.

### Why are companies appointing CKOs?

We are in a business climate with a growth focus, as opposed to the reengineering or downsizing focus of the late '80s and early '90s. We've bottomed out in terms of what we can achieve in increased profitability through reengineering. The absolute focus [in corporations] is now on growth and innovation.

There has also been an accelerated move from the industrial economy to the knowledge economy. Also, companies are finding that they have all this information out there, but people can't get it.

### What needs to be done to the computing infrastructure to support knowledge sharing?

From a network perspective, we need one-to-one connectivity to the World-Wide Web. Today, connectivity is more important than computing capability. During the next five years, most multinational companies will spend more money on communications than they do on computation.

Network security is incredibly important, too. However, one of the most frustrating issues relates to the global network. The cost of computing and the availability of secure environments across the globe severely hamper our ability to create a coherent, ubiquitous environment. This is particularly difficult considering that most multinationals are making enormous investments in third-world countries, where there is little [networking] infrastructure to count on.

To combat this, some organizations have established private virtual networks that combine land lines and satellites. Another obvious bridge is to use wireless networks.



Knapp is one of the CKOs emerging in the consulting world.

### How does groupware enable knowledge sharing?

Clearly, traditional groupware products like [Lotus Development Corp.'s] Notes are becoming more suited for this because we're seeing a move toward a nonproprietary software paradigm among them. The vendors are adopting the metaphor and presumed ubiquity of the Web as the fundamental communication environment. The part of groupware that is really interesting can be found in companies that are building intelligent agents and knowledge agents.

At Coopers, we subscribe to news services, generate lots of our own knowledge and have a lot of information embedded in legacy systems. With software agents, you can request, for example, that information on three specific companies be delivered to your desk each morning.

Other products could help enormously, such as add-ons to groupware products that create knowledge maps of all the data in the company. There are also products that function as yellow pages for all the corporate databases. Such things make it easy to traverse your way through knowledge.

Most products in this category work across one type of database, though. We need software that works across multiple knowledge repositories. ■

## MANAGEMENT DATA ONLINE

*Network World* peruses online services for interesting tools or tips that will make your job easier and help you better manage your career. Here are a few:

### Virus outbreak prevention

Ever wish your end users could do more to help you stamp out computer viruses? Make it a point to have them place a bookmark in their Web browsers for the antivirus.com site maintained by Trend Micro, Inc. The site has a Virus Emergency Room where users can go to get help in determining if their client workstations have picked up a virus from somewhere on the network. Users can also submit a sample of files they think might be infected with a virus for examination and receive notification of the results.

In addition, there is a virus alert area where users can get the skinny on the latest virus outbreaks and their likely causes. They can also subscribe to the Anti-Virus mailing list in this area.

You may want to look around the site, too. There is a white paper called "Viruses & the Internet" posted for download. The paper is aimed at LAN administrators and systems integrators and details the threat Internet viruses pose to internal networks. Of course, Trend uses publication of the paper as a chance to introduce readers to its antivirus products for the Internet.

### A downtime cost calculator

Software vendor Interpose, Inc. and consulting firm Strategic Research Corp. have posted a Java applet that enables you to see how much money your company loses when network servers go down. The applet prompts you for the number of employees and LAN administrators in your company along with information about the length of the work week and gross revenue. Then you input data about what LAN administrators and end users are paid and the amount of downtime suffered.

The Network Server Downtime Opportunity Cost Analysis Tool then tells you how much revenue your company lost due to outages and how that breaks down on a per-employee basis. It also tallies how many hours of downtime you had and how much each outage cost you.

### Benchmark repository

DFW Internet Services, Inc. has a Benchmark Scores Comparison Lists area where you can pick up results of various performance benchmark tests for DOS-, Windows-, OS/2- and Unix-based clients. In addition to describing various benchmarks, the site maintains a list of test results posted by other users. If you don't have a copy of the various benchmarks, links are provided to sites where you can download them. The benchmarks will help you better tune your clients for optimal performance.

You can use Network World Fusion as your launching pad to the World-Wide Web sites mentioned here. Type the above number into the DocFinder box on the home page.

9605 FUSION

Network World Fusion  
<http://www.nwfusion.com>

## Briefs

■ **LearningTree International** has added eight courses to its instructor-led curriculum.

The courses are:

- Hands-On Routers: Building Multiprotocol Internetworks
- Hands-On ISDN for Data Communications
- Microsoft Windows NT 4.0 Workstation and Server
- Hands-On Windows NT Optimization and Troubleshooting
- Hands-On Implementing Windows NT Security
- Hands-On Windows Networking
- Hands-On Microsoft Access Programming
- Hands-On Microsoft Exchange

The courses run four to five days at nationwide Learning Tree education centers and cost between \$1,995 and \$2,295.

■ **The National Computer Security Association (NCSA)** and the **Computer Ethics Institute** are cosponsoring **CyberRisk '96** Nov. 7 and 8 in Arlington, Va.

The conference will help IS managers and network professionals learn how to deal effectively with liability issues surrounding network connectivity. Conference sessions include Workplace Monitoring; E-mail and Electronic Communications Privacy; and Virtual Organizations.

The cost is \$595. NCSA members can attend for \$525.

NCSA: (717) 258-1816.



# "NOBODY UNDERSTANDS ME."

If "dot com" are two of the most commonly used words in your vocabulary, we speak your language. We have one of the largest computer networks in the world—an internal intranet with over 50,000 web pages and growing daily. We also have an exploding client-server architecture that will employ distributed databases; object oriented technology; integrated video, data and voice to the desktop; mobile computing; virtual reality; groupware and a long list of other capabilities that grows by the minute. If it's happening in the world of Information Systems, we have it. What we don't have are enough Information Systems Engineers, Programmer Analysts, System Administrators and other computer wizards. If you're interested in doing things that have never been done before, talk to us. We'll understand. So, stop by our booth or send your resume to The Boeing Company, P.O. 3707, M/S 6H-RC, NWIA96, Seattle, WA 98124 Fax number (206) 965-4010. Or complete your resume format on the Boeing home page at <http://www.boeing.com>.

An Equal Opportunity Employer Supporting Diversity in the Workplace.

**BOEING**

## ATTENTION NETWORK COMPUTER COMMUNICATIONS PROFESSIONALS

While attending NetWorld+Interop '96 Atlanta, drop by the Network World sponsored Career Fair. The Fair is located at Level 2 East in Room 218. Hours are from 10-6 Wednesday, September 18th and Thursday September 19th. 10-4 on Friday, September 20th.

Speak with Representatives from the top companies in the Networking Field:

The Boeing Corporation  
Cabletron Systems  
Cisco Systems  
CompuServe  
COM 21

DEC  
GTE  
and  
NOVELL

FUJITSU BUSINESS COMMUNICATION SYSTEMS

## ATM to the forefront.

Fujitsu Business Communication Systems, Inc. is leading the drive to replace client/server architecture with a user oriented structure. Multimedia is the resulting industry buzzword, and we're light years ahead. Our multimedia platform and asynchronous transfer mode switches provide the narrow bandwidth, wideband and broadband networking capabilities that multimedia enterprise networks demand. ATM expertise puts you at the leading edge. Opportunities are located throughout the U.S.

### ATM SALES ENGINEER

Through your extensive background in the design and implementation of ATM and client/server networking solutions, you will provide technical expertise for pre/post sales activities. This will include designing solutions, assisting with RFPs, giving presentations/demonstrations, and providing installation, operation and maintenance support. Ideal candidates will have a BSCS/EE and 3-5 years of related experience (including 3+ years supporting customer networks). Novell CE certification required, in addition to knowledge of Network Operating Systems (NOS). Must be a proven problem-solver with excellent sales/presentation/customer service skills.

### ATM ACCOUNT MANAGER

In expanding our presence in the market, you will develop new accounts and increase business with existing clients. Qualified candidates will have a BA/BS degree (or equivalent) and an extensive background in data communications sales. Must be a solid strategist with the ability to understand and communicate technical product issues.

FOR BOTH POSITIONS, in-depth knowledge of TCP/IP, UNIX, OSPF, RIP, Ethernet, Frame Relay, ATM and the Internet is highly desirable.

### OTHER SALES OPPORTUNITIES

Major Account Manager, Account Manager and Associate Account Manager opportunities are also available throughout the U.S.

Fujitsu offers superior compensation, excellent benefits and the meaningful rewards of a rich, multicultural environment. For immediate consideration, send your resume with salary history, to:

**FUJITSU BUSINESS COMMUNICATION SYSTEMS, INC.,**

Attn: Human Resources, 3190 Miraloma Ave., Anaheim, CA 92806. Fax: 714/764-3859. EOE M/F.

**FUJITSU**

Be sure to visit us on the Internet!  
<http://www.fujitsu.com/FBCS/>

## General Manager

Singapore Telecom is seeking a General Manager for its expanding North American operations. You'll manage sales, technical support, customer service and marketing. Requires 5 years international telecom experience (user and/or vendor), strong product knowledge and people skills.

Fax resume and salary requirements to: Toni (203) 226-6640

or mail to: Singapore Telecom USA  
320 Post Road West  
Westport, CT 06880

**Singapore Telecom**



# WELCOME TO PLANET INTERNET.



## TRANSPORTATION PROVIDED BY CISCO SYSTEMS

Cisco Systems, Inc. is the leading global supplier of internetworking solutions, including routers, LAN and ATM switches, dial-up access servers and network management software. These products, integrated by the Cisco Internetwork Operating System (Cisco IOS™), link geographically dispersed LANs, WANs and IBM networks.

### ENGINEERING & SALES OPPORTUNITIES:

- |                                     |                                 |
|-------------------------------------|---------------------------------|
| ■ REGIONAL SALES MANAGERS           | ■ SOFTWARE ENGINEERS            |
| ■ ACCOUNT MANAGERS                  | ■ SOFTWARE TEST ENGINEERS       |
| ■ SYSTEMS ENGINEERING MANAGERS      | ■ HARDWARE ENGINEERS            |
| ■ SYSTEMS ENGINEERS                 | ■ HARDWARE DIAGNOSTIC ENGINEERS |
| ■ CHANNEL MARKETING REPRESENTATIVES | ■ TECHNICAL SUPPORT ENGINEERS   |
| ■ MANAGER TELEBUSINESS              | ■ INSIDE SYSTEMS ENGINEERS      |

### VISIT OUR BOOTH AT THE NETWORK COMPUTING CAREER FAIR!

GEORGIA WORLD CONGRESS CENTER

SEPT. 18TH & 19TH • 10 AM - 6 PM

SEPT. 20TH • 10 AM - 4 PM

### OR VISIT OUR RECRUITMENT HOSPITALITY SUITE AT THE WESTIN HOTEL!

SEPT. 18TH & 19TH • 10 AM - 10 PM

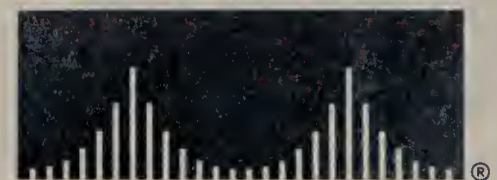
SEPT. 20TH • 10 AM - 6 PM

For detailed job descriptions of our 1000+ open positions,  
visit us on the Web at:

**<http://www.cisco.com/jobs>**

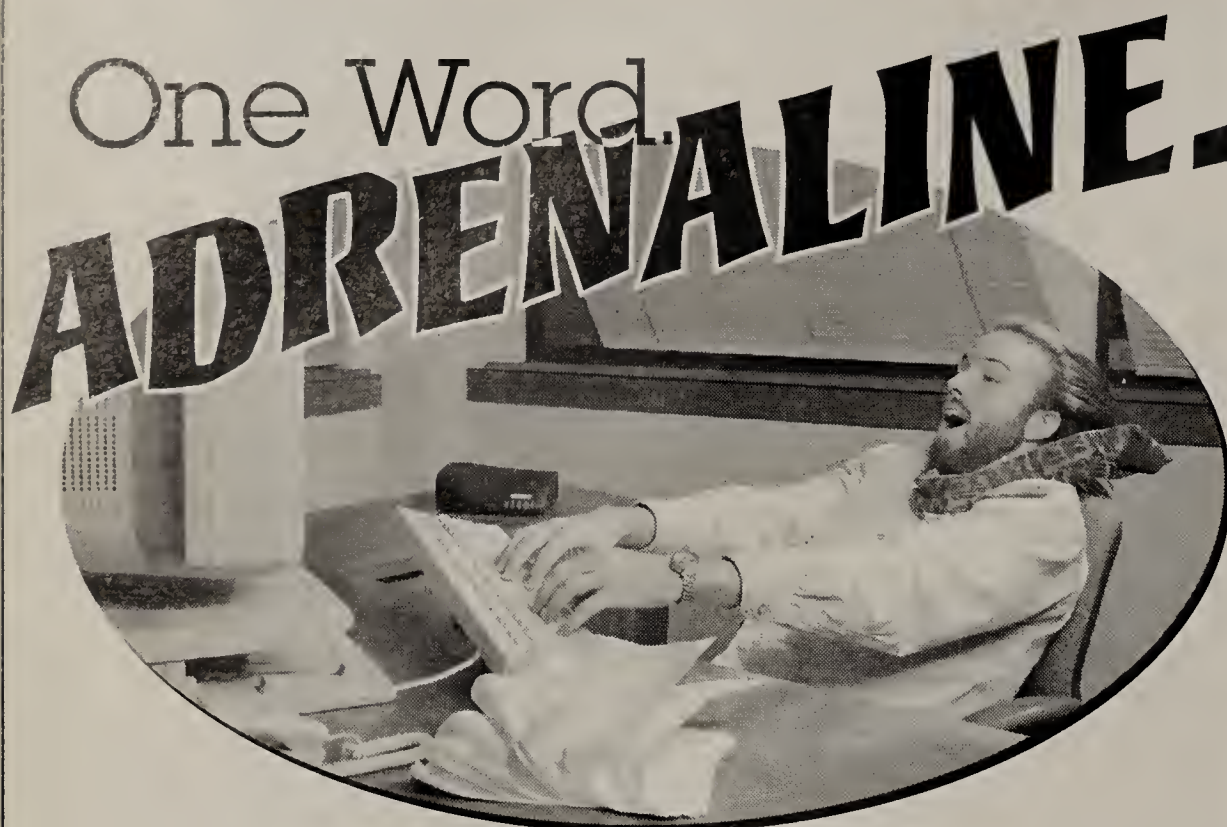
To apply, please send your resume indicating position of interest, to: Cisco Systems, Inc., Human Resources/Network World, 7025 Kit Creek Road, P.O. Box 14987, Research Triangle Park, NC 27709. FAX (800) 818-9202 (please use white paper with 12 point plain black font). E-mail: [jobs@cisco.com](mailto:jobs@cisco.com) (ASCII only). EOE. All trademarks belong to their respective companies.

**CISCO SYSTEMS**



The Network Works.  
No Excuses.™





In a rush of endorphins the start-up team at COM21 is building a revolution. Creating an ATM-based cable modem system using the new hybrid fiber-coax technology. Technology that's scalable and open. It'll support online graphics and multimedia. Make the Internet 1000X faster. Offer bandwidth on demand. It's technology that'll rock the telecommunications world. And capture the bulk of a \$200 billion market. It's ground floor. It's huge. And you can make it real. Join COM21 today.

## Engineering

- ASIC Project Lead
- ASIC DVT Lead
- Systems Architect, Network Products
- Software Engineers, Network Management
- Systems Architect, Telephony
- Hardware Engineer, Telephony
- Software Engineer, Telephony
- Software QA Engineers
- Integration Engineer
- Hardware Engineers, Digital Circuit Design
- Hardware Design Project Engineer

## Sales/Service/Marketing

- Director, Field Engineering
- Systems Engineers
- Product Marketing Manager
- Customer Support Consultant
- Account Managers

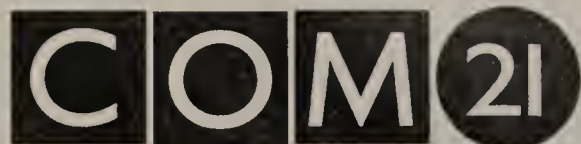
## Operations

- Materials/Logistics Manager
- Supplier Quality Engineer
- Test Engineer
- Materials & Traffic Support

All positions require previous experience in the communications arena.

To apply for these positions, please send your resume **INDICATING POSITION TITLE OF INTEREST AND JOB CODE IO0918** to: Com21 Inc, 750 Tasman Dr., Milpitas, CA 95035. Fax: (408) 953-9299 or e-mail: [sjm\\_res@com21.com](mailto:sjm_res@com21.com) (ASCII only). Or call our Job Hotline at (408) 953-9268. EOE.

See us on the web at: <http://www.com21.com/>



Communications for the 21st Century

## NETWORK SYSTEMS SALES • PRE- & POST-SALES ENGINEERS

Do You Have?  
the VISION?



While other companies are selling legacy hardware, MAXNET evaluates, deploys and supports emerging network technologies from multiple manufacturers, and builds the most advanced network systems available for our customers. MAXNET's product and service offering evolves with technology. Our sales and engineering teams continually expand their expertise to build and support progressive network systems.

The MAXNET Advantage...

- Manufacturer-Independent
- State-of-the-art Network Control Center and Interoperability Lab
- Proof-of-technology program
- Engineering-driven company
- Focus on customer service
- Highest-level manufacturer certifications
- Nationwide customer base

MAXNET's core technology focus includes: LANs/WANs/MANs, ATM, SNA, Frame Relay, Remote Access and LAN Switching

MAXNET is seeking talented people with the vision to market and support next-generation network systems.

## NETWORK SYSTEMS SALES

Experienced sales professionals needed to sell networking products and services. Rapid growth demands expansion in our New York, Washington D.C., Atlanta, Boston and Florida territories. Previous systems sales preferred, along with excellent written communication and presentation skills. Base salary plus performance incentives make your earnings unlimited.

## PRE- AND POST-SALES ENGINEERS

Both pre- and post-sales positions available in Charlotte, Washington D.C., Atlanta, New York, Boston and existing offices along the east coast. Both require 3+ years experience in pre/post-sale support role for enterprise networks, and expertise in LANs/WANs/MANs, ATM, SNA, Frame Relay, Remote Access and LAN Switching. Presentation and writing skills are a MUST. Project management experience is a plus.

Qualified applicants, please send resume to MAXNET, Dept. NW-EY, 225 East Dania Beach Blvd., Dania, Florida 33004. EOE.



Solutions for enterprise networking

**Senior SAP Programmer/Analyst** (Currently six openings nationwide): Assist clients to configure and implement SAP systems and serve as lead technical programmer on client engagements. Design and develop SAP interfaces with existing Legacy systems. Coordinate and implement conversion routines. Develop and maintain ABAP programs and reports. Provide technical expertise in SAP's Consumer Packaged Goods functionality for clients. Position requires bachelor's degree in Computer Science and two years prior experience in this position or as a programmer/analyst. Prior experience must utilize SAP software (R/2 and R/3 versions), including the SAP-RV, -RM, -RF, and -RK modules, with the ABAP/IV programming language and screen painter. Employer will accept a combination of education and employment experience equivalent to a bachelor's degree in Computer Science, as evaluated by a professional educational credential evaluation service. 40 hrs/wk; 8:00am-5:00pm; salary of \$75,000.00-196,000/yr. Send resume with Social Security No. to Indiana Dept. of Workforce Development, 10 N. Senate Ave., Indianapolis, IN 46204-2277, Attention: Gene R. Replogle. Include ID#3379765 with response. Applicants must be eligible for permanent employment in the United States.

**Software Consultant:** provide software design & development services to clients; design, develop & support business applications such as consumer broadband telecommunication & billing systems for managing telephony-multimedia communications networks & services using SQL\*Forms, HP UX, SQL\*Plus & TCP/IP Protocol; track & correction program discrepancies, prepare program development & design log templates, test SOLAOL (Schwab Online using America Online), write GUI screens, convert applications from Pseudo spoolers to network printer, enhance report modules, working with Windows, Informix 4GL, SQL, C, RS6000, Excel, Unix, SunSpare & Solaris systems. \$49,754/yr. 40 hrs/wk. B.S. or equivalent in Computer Sc. or Computer Eng. & 2 yrs. exp. in job offered or 2 yrs. related exp. as Systems Analyst or Programmer Analyst. 2 yrs. exp. in job offered or in related occupations must include use of SQL\*Forms, HP US, SQL\*Plus, TCP/IP, Windows, Informix 4GL, SQL, C, RS6000, Excel, Unix, SunSpare & Solaris. May work at unanticipated locations throughout the U.S. Submit resume to the GA Dept. of Labor, 1535 Atkinson Rd., Lawrenceville, GA 30243-5601 or the nearest Dept. of Labor Field Service Office. Job Order #GA6013665.

**Software Consultant:** Provide services to clients in design & development of business applications & systems; develop invoicing & order processing modules to support sales information, allocations, order tracking, & inventory databases using HP9000, Unisys 500/50, Unix OS, Informix Online, Informix Standard Engine, ESQ/C, 4GL, SQL & Shell; develop interfaces to reduce application development time; develop backup & restore scripts; create user segments & indexes for faster query time; develop maintenance programs for screen functions; convert applications from client systems to Unix, Unisys & HP environments; provide technical support to users. \$49,754/yr. 40 hrs/wk. Mon-Fri. B.S. or equivalent in Computer Sc. or Computer Eng. or Computer Sc. & Mathematics & 2 yrs. exp. in job offered or 2 yrs. related exp. as Systems Analyst or Programmer Analyst to include use of HP9000, Unisys 500/50, Unix OS, Informix Online, Informix Standard Engine, ESQ/C, 4GL, SQL & Shell. May work at unanticipated locations in the U.S. Submit resume or apply in person to the GA Dept. of Labor, 1535 Atkinson Rd., Lawrenceville, GA 30243-5601 or to the nearest Dept. of Labor Field Service Office. Job Order #GA6019157.



## Director of Software Engineering

### Wireless LANs

A Silicon Valley, high technology company is looking for a Director of Software Engineering.

In this high-profile position, you will lead a talented group of Engineers developing the latest in LAN products. You'll provide technical, organizational and product leadership to continue our success in the wireless LAN market. Leading product development to deliver advanced wireless to wired bridges, WLAN PCMCIA cards, Win NT and other OS drivers and tools will be key. You will also lead strategic planning of new products and the technical foundations to assure the most effective development environment.

We're looking for a proven leader with 10+ years' experience to own product development and deliver complete products. Must also have architecture and technical implementation skills to direct advanced software development, as well as a background in LAN technology.

Excellent salary, bonus and stock option package. For immediate consideration, please send your resume to: BHA, c/o CR916, 2100 Geng Road, Palo Alto, CA 94303; FAX (415) 856-1181. EOE.

### COTF COMPUTER NETWORK POSITIONS

The NASA Classroom of the Future (COTF) program at Wheeling Jesuit University (WJU) is seeking two highly skilled individuals to provide expertise and technical skills in advanced computer and telecommunications technologies. Both positions provide technical assistance and training to staff and users of software products produced by COTF; investigate and resolve software and hardware problems; and maintain inventories and maintenance schedules. Additional information is listed in the "staff" section of COTF homepage at address: <http://www.cotf.edu/>

### MANAGER, COMPUTER NETWORK SERVICES

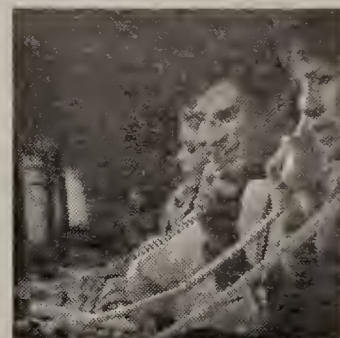
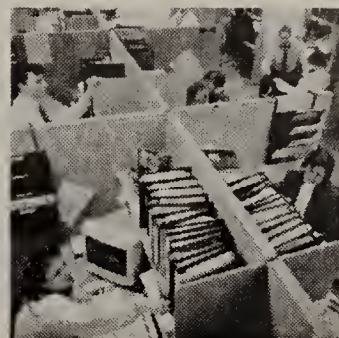
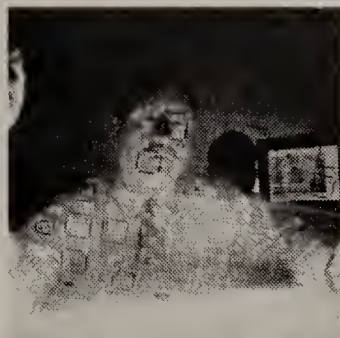
Responsible for maintaining the computer network and managing the computer services group. Duties include maintaining the ATM and ethernet network; maintaining WAN connectivity; managing workstations, Groupware, Novell and Unix servers; and coordinating procurement and installation. Master's degree in computer science, electrical (computer engineering emphasis) or computer engineering, or equivalent required.

### COMPUTER SUPPORT ANALYST (HELP DESK)

Responsible for staffing and managing the COTF help desk. Duties include maintaining the help desk for multimedia products developed by COTF; and assisting with installation of hardware and software. Bachelor's degree in computer science, electrical or computer engineering, or equivalent required.

A review of applications for both positions will begin on September 30, 1996, and continue until filled. Send letter of application, resume, and current references to Susan Tate, Director of Human Resources, Wheeling Jesuit University, 316 Washington Ave., Wheeling, WV 26003. AA/EOE

# The Secret To Our Success...



## Our People.

Cabletron Systems isn't like other companies. We don't have meetings about our way of doing things. Our people just do it. We don't have formal organizational charts. Instead, our people take the initiative and reap the reward. And an idea is not a formality. It's the reason we come to work everyday.

### Our people:

- use the most advanced tools, computers and development equipment available
- create and market the latest technology for an impressive array of fortune 500 customers
- enjoy the responsibility and the authority to get the job done
- expect to be challenged and have a passion for their work
- receive recognition for their accomplishments
- earn rewards with competitive salaries, equity sharing and a comprehensive benefits package
- value the people they work with as much as the work they do
- make a difference in an exciting, ever-changing, growth industry with a company that leads the way

### PRODUCT MARKETING

Product Managers  
Product Marketing Managers  
Technology/Marketing Specialists

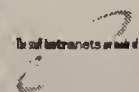
### ENGINEERING

Routing/Switching Architects  
Routing/Switching Firmware Eng.  
Software Engineers (OODB,OO)  
JAVA, VLAN, NT and WEB Technology (Developers, Project Leaders and Managers)  
Spectrum Professional Services (Software Eng. and Program Managers)  
SAP Programmers  
Usability Specialists  
ASIC Design/Hardware Engineers  
ATM Firmware/Hardware Engineers  
VLAN Firmware Engineers  
Virtual FW Switching Engineers

Relocation assistance is available for qualified applicants.

Network Mgt. Application Developers  
PCB Design Engineers  
Simulation Engineers  
WAN Firmware/Hardware Engineers  
Switching Firmware/Hardware Eng.  
Fast Ethernet Firmware/Hardware Eng.

Realize your success... at Cabletron. To become a member of the Cabletron team, forward your resume with position of interest to Cabletron Systems-Corporate, P.O. Box 5005, Rochester, NH 03866-5005, e-mail: [jobs@cabletron.com](mailto:jobs@cabletron.com); fax (603) 337-1305. Additional opportunities may exist throughout Cabletron with over 100 offices worldwide. EOE. Proud of our diverse workforce. Dedicated to a clean environment.



<http://www.cabletron.com/jobs/>

free  
free  
free  
free  
free  
free

<http://www.nwffusion.com>

If you are interested in management strategies, career information and job listings, visit the Networking Careers section of Network World Fusion at the above address.

Network World's new Web offering Network World Fusion is the most comprehensive and educational advertising environment on the WWW. Recruitment print ads will be placed on **Network World Fusion for 4 weeks - free.**

Advertisers who would like more information on the Network World Fusion options should call Pam Valentinas at (800) 622-1108.



## Networking FORE the future.

Everyone talks about the future of networking, the next step, the cutting edge. But only FORE Systems is already there. With our impressive portfolio of top performing products and the largest installed base of ATM LAN solutions worldwide, we are clearly the dominant player in the ATM marketplace. Our plans for the future will help us build on this leadership position to reach new levels of success, creating outstanding opportunities and a great future...for the talented people who join us. Multiple positions exist for professionals with experience in one or more of the following areas at our development sites in Pittsburgh, PA, Boxborough, MA, Bethesda, MD, San Jose, CA, and Ottawa, ON.

### HARDWARE ENGINEERING (Pittsburgh, Boxborough & San Jose)

- Design of Hot Swappable Boards, Power Supplies & MTBF Calculations
- Development Management
- Digital Analog Design & Test
- Familiarity with FPGA/Gate-Array Design
- Embedded CPU Design Engineers
- ASIC Development & Verification (VHDL)
- LAN/WAN Product Development
- ATM Interface Design Engineers
- Hardware Validation & Test Engineers

### SOFTWARE ENGINEERING (All locations)

- Development Management
- ATM Signaling Development
- ATM Routing Protocols
- UNIX Device Driver Software and/or Kernel Development
- Network Protocol Development
- LAN/WAN Product Development
- Network Management Software (e.g. SNMP)
- Software Testing Configuration Management and/or Quality Control
- Switch/Adapter Card Software and Performance Profile Testing
- Windows NT and/or Novell NetWare Device Driver Software
- AppleTalk Design Engineers
- Embedded Systems Design Engineers
- Interoperability Lab Manager

### MANUFACTURING (Pittsburgh)

- Manufacturing Test Engineers
- Production Control Planners
- New Product Introduction Program Managers
- Materials/Planning & Control
- Subcontract Manufacturing Planners & Program Managers
- Manager - Traffic, Stores & Warehouse
- Manager - Customer Service & Logistics
- Senior Buyers - Mechanical & Electrical Components
- Product Managers

### SALES, MARKETING & TECHNICAL SUPPORT

- Technical Trainers (All locations)
- Technical Support Engineers (San Jose & Pittsburgh)
- System Engineers (All locations)
- Account Managers (All locations)
- Product Managers (San Jose, Boxborough & Pittsburgh)
- Director, Software Engineering Marketing (Pittsburgh or San Jose)

Besides our energetic and innovative corporate culture, we offer an impressive compensation and benefits package which includes a generous stock purchase program, 401(k) plan, flex-time, tuition reimbursement and much more. Forward resume indicating area of interest to FORE Systems, HR Dept./NWSH, to your preferred geographic location:

- **Pittsburgh, PA, Bethesda, MD or Ottawa, ON** - Research Park, 5800 Corporate Dr., Pittsburgh, PA 15237, FAX (412) 635-3400. Email: [resumes@fore.com](mailto:resumes@fore.com)
- **San Jose, CA** - 2115 O'Neil Drive, San Jose, CA 95131. FAX: (408) 441-9657. Email: [resumes@fore.com](mailto:resumes@fore.com)
- **Boxborough, MA** - 85 Swanson Rd., Boxborough, MA 01719. FAX (508) 264-4433. Email: [resumema@fore.com](mailto:resumema@fore.com)

We are an equal opportunity employer with a corporate commitment to diversity.

**FORE**  
SYSTEMS

At the Forefront of ATM Networking

Check us out at <http://www.fore.com>

the power of driven

# PERFORMANCE

in telecommunications

Winning Performance and Leadership. They are the result of know-how, preparation and strength. Then combine the confidence with striving dedication. When all these elements are put into motion, the momentum is unmistakable. This is the nature of Booz-Allen & Hamilton Inc., an international management and technology consulting firm. Come explore our supportive, growing team. We have the following opportunities available:

- Advanced Intelligence Networks
- API Development: Visual Basic, C++, Delphi, PowerBuilder
- Call Processing and Features Development
- Cost/Benefit Analysis of Telecommunications Products
- Electrical Engineering
- FTS2000 Pricing
- Land Mobile Radio Communications
- LAN/WAN
- Market/Technical Planning and Analysis
- Network Design/Installation/Integration/Security
- Network Protocols: TCP/IP, X.25, IPX/SPX, ATM, Frame Relay, ISDN
- R&D/Lab Environment
- Switching, Transmission, Signaling Systems
- Voice, Telephony/PBX, CPE
- Wireless/Cellular Communications
- X.400, X.500, Electronic Messaging and Directory Services

We offer very competitive salaries and comprehensive benefits. For consideration, please send your resume to: Dept. 9159/RM. E-mail: [wtbresume@bah.com](mailto:wtbresume@bah.com) (ASCII text) FAX: (703) 902-3063. Mail: Booz-Allen & Hamilton, 8283 Greensboro Dr., McLean, VA 22102. Equal Opportunity Employer.

To learn more, visit our site on the World Wide Web: <http://www.bah.com>

BOOZ-ALLEN & HAMILTON

Careers at the Pace of Technology

## Don't Miss Our Annual

## Salary Survey

in the  
September  
23rd Issue.



# Reader Service Card

**IT'S EASY.** Circle the number on this card which corresponds to the number at the bottom of the advertisement. Mail or FAX to (413) 637-4343 today. Information will be provided to you FREE of charge.

Circle the number below which corresponds to the number at the bottom of the advertisement for more information.

## DISPLAY ADVERTISING

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135
136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153
154	155	156	157	158	159	160	161	162

## MARKETPLACE

163	164	165	166	167	168	169	170	171
172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261
262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279
280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297
298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324

Please check all of the products for which you are interested in receiving FREE information.

## COMPUTERS/PERIPHERALS

- 600 ☐ Backup Devices
- 601 ☐ Cabling and Cabling Systems
- 602 ☐ Micros/PCs
- 603 ☐ Mainframes
- 604 ☐ Minis
- 605 ☐ Printers
- 606 ☐ Storage Devices
- 607 ☐ Terminals
- 608 ☐ UPS
- 609 ☐ Workstations

## SOFTWARE

- 610 ☐ Applications
- 611 ☐ Client/Server Application Development
- 612 ☐ Communication/Terminal Emulation
- 613 ☐ Computer Operating Systems
- 614 ☐ Database Management/RDBMS
- 615 ☐ E-Mail
- 616 ☐ Groupware
- 617 ☐ LAN Operating Systems
- 618 ☐ Network Diagramming
- 619 ☐ Network Management
- 620 ☐ Security
- 621 ☐ Suites
- 622 ☐ Systems Management

## INTERWORKING

- 623 ☐ Bridges
- 624 ☐ Routers
- 625 ☐ Gateways

## LOCAL AREA NETWORKS

- 626 ☐ ATM Switches
- 627 ☐ Ethernet Switches
- 628 ☐ Hubs/Intelligent Hubs
- 629 ☐ LAN Servers
- 630 ☐ Local Area Networks
- 631 ☐ Network Adapter Boards/NICs
- 632 ☐ Peer-to-Peer LANs
- 633 ☐ Print Servers
- 634 ☐ Remote LAN Access

- 635 ☐ Remote Access/Communication Servers
- 660 ☐ Security
- 636 ☐ SNMP Network Management
- 661 ☐ Storage
- 637 ☐ Superservers
- 638 ☐ Wireless Networks

## REMOTE/WIRELESS COMPUTING

- 639 ☐ Laptops, Notebooks
- 640 ☐ PCMCIA
- 641 ☐ Mobile Data Equipment and Services
- 642 ☐ Wireless Data Equipment and Services

## WAN EQUIPMENT AND SERVICES

- 643 ☐ ATM
- 644 ☐ CIT (Computer Integrated Telephony)
- 645 ☐ Diagnostic, Monitoring and Test Equipment
- 646 ☐ DSU/CSU
- 647 ☐ E-Mail/On-Line Services
- 648 ☐ FAX Boards/Modems
- 649 ☐ Fiber Optics
- 650 ☐ Frame Relay
- 651 ☐ ISDN
- 652 ☐ Modems
- 653 ☐ PBX
- 654 ☐ Security
- 655 ☐ SMDS
- 656 ☐ T1, T3, Fractional T1 Mux and Services
- 657 ☐ Videoconferencing/Teleconferencing
- 658 ☐ WATS/MTS

- 659 ☐ Firewalls
- 660 ☐ Web Servers
- 661 ☐ Internet Software Tools

## INTERNET/ELECTRONIC COMMERCE

- 659 ☐ Internet Access Providers/Services
- 660 ☐ Internet Access
- 661 ☐ Internet Software Tools
- 662 ☐ Education and Training
- 663 ☐ Storage Cabinets/Furniture

# NetworkWorld

ISSUE DATE 9/16/96

CARD MUST BE RECEIVED BY 12/16/96

NAME

TITLE

COMPANY

STREET

CITY/STATE/ZIP

PHONE

FAX

E-MAIL ADDRESS

FILL OUT, DETACH AND MAIL

Now it's easy to find valuable information on the latest products and services with *Network World's* Reader Service Card - FREE!

FILL OUT, DETACH AND MAIL

# Reader Service Card

**IT'S EASY.** Circle the number on this card which corresponds to the number at the bottom of the advertisement. Mail or FAX to (413) 637-4343 today. Information will be provided to you FREE of charge.

Circle the number below which corresponds to the number at the bottom of the advertisement for more information.

## DISPLAY ADVERTISING

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135
136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153
154	155	156	157	158	159	160	161	162

## MARKETPLACE

163	164	165	166	167	168	169	170	171
172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261
262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279
280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297
298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324

Please check all of the products for which you are interested in receiving FREE information.

## COMPUTERS/PERIPHERALS

- 600 ☐ Backup Devices
- 601 ☐ Cabling and Cabling Systems
- 602 ☐ Micros/PCs
- 603 ☐ Mainframes
- 604 ☐ Minis
- 605 ☐ Printers
- 606 ☐ Storage Devices
- 607 ☐ Terminals
- 608 ☐ UPS
- 609 ☐ Workstations

## SOFTWARE

- 610 ☐ Applications
- 611 ☐ Client/Server Application Development
- 612 ☐ Communication/Terminal Emulation
- 613 ☐ Computer Operating Systems
- 614 ☐ Database Management/RDBMS
- 615 ☐ E-Mail
- 616 ☐ Groupware
- 617 ☐ LAN Operating Systems
- 618 ☐ Network Diagramming
- 619 ☐ Network Management
- 620 ☐ Security
- 621 ☐ Suites
- 622 ☐ Systems Management

## INTERWORKING

- 623 ☐ Bridges
- 624 ☐ Routers
- 625 ☐ Gateways

## LOCAL AREA NETWORKS

- 626 ☐ ATM Switches
- 627 ☐ Ethernet Switches
- 628 ☐ Hubs/Intelligent Hubs
- 629 ☐ LAN Servers
- 630 ☐ Local Area Networks
- 631 ☐ Network Adapter Boards/NICs
- 632 ☐ Peer-to-Peer LANs
- 633 ☐ Print Servers
- 634 ☐ Remote LAN Access

- 635 ☐ Remote Access/Communication Servers
- 660 ☐ Security
- 636 ☐ SNMP Network Management
- 661 ☐ Storage
- 637 ☐ Superservers
- 638 ☐ Wireless Networks

## REMOTE/WIRELESS COMPUTING

- 639 ☐ Laptops, Notebooks
- 640 ☐ PCMCIA
- 641 ☐ Mobile Data Equipment and Services
- 642 ☐ Wireless Data Equipment and Services

## WAN EQUIPMENT AND SERVICES

- 643 ☐ ATM
- 644 ☐ CIT (Computer Integrated Telephony)
- 645 ☐ Diagnostic, Monitoring and Test Equipment
- 646 ☐ DSU/CSU
- 647 ☐ E-Mail/Dn-Line Services
- 648 ☐ FAX Boards/Modems
- 649 ☐ Fiber Optics
- 650 ☐ Frame Relay
- 651 ☐ ISDN
- 652 ☐ Modems
- 653 ☐ PBX
- 654 ☐ Security
- 655 ☐ SMDS
- 656 ☐ T1, T3, Fractional T1 Mux and Services
- 657 ☐ Videoconferencing/Teleconferencing
- 658 ☐ WATS/MTS

- 659 ☐ Firewalls
- 660 ☐ Web Servers
- 661 ☐ Internet Software Tools

## INTERNET/ELECTRONIC COMMERCE

- 659 ☐ Internet Access Providers/Services
- 660 ☐ Internet Access
- 661 ☐ Internet Software Tools
- 662 ☐ Education and Training
- 663 ☐ Storage Cabinets/Furniture

ISSUE DATE 9/16/96

CARD MUST BE RECEIVED BY 12/16/96

NAME

TITLE

COMPANY

STREET

CITY/STATE/ZIP

PHONE

FAX

E-MAIL ADDRESS



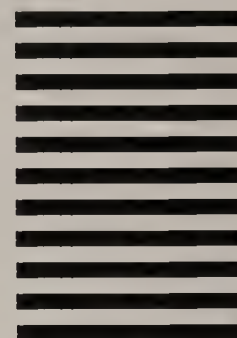
Pass this card along to a colleague so they, too, can get valuable product information FREE.



**FREE Product Info**



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES



**BUSINESS REPLY MAIL**

FIRST CLASS MAIL PERMIT NO. 716 PITTSFIELD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

# NetworkWorld

PO BOX 5090  
PITTSFIELD MA 01203-9838

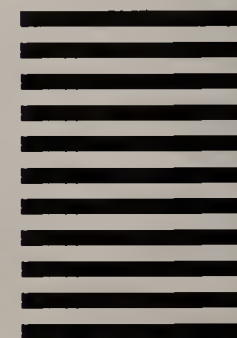


**Your resource for  
enterprise network  
computing information.**

**FREE Product Info**



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES



**BUSINESS REPLY MAIL**

FIRST CLASS MAIL PERMIT NO. 716 PITTSFIELD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

# NetworkWorld

PO BOX 5090  
PITTSFIELD MA 01203-9838



**FREE Product Info**



# AFTER EATING THE COMPETITION'S LUNCH FOR SO LONG, WE'RE EXPANDING.



Outstanding technolo-  
gies. Supreme services.  
And unmatched oppor-  
tunities. We're GTE,  
the nation's largest

local telephone company and fourth  
largest publicly owned telecommunica-  
tions company in the world. Due to  
incredible growth, we're expanding at an  
unprecedented rate in long distance,  
internet, and wireline and wireless ser-  
vices. And we're seeking talented, cre-  
ative, ambitious telecommunications  
professionals to grow along with us.

Plan to visit GTE's booth at the  
Network World Career Fair, September  
18-20 at the Georgia World Congress  
Center. If you are interested in employ-  
ment at GTE but are unable to attend  
the Career Fair, please fax your resume,  
referencing the appropriate job code, to:  
(214)718-3179. Visit GTE's website at  
<http://www.gte.com>.

GTE is an equal opportunity employ-  
er and supports workforce diversity,  
M/F/D/V.



## TECHNICAL

### ADVISORY SYSTEMS ENGINEER - JOB CODE (ASE/INS)

- Evaluate new/existing products & technologies, create technical specifications for new applications
- BSCS with 5+ years' exp. with database normalization, JAVA, Perl, HTML & proven leadership capabilities
- SQL, C &/or C++, Internet Protocols, Windows NT

### SR. ANALYST - PRODUCT DOCUMENTATION - INTERNET - JOB CODE (SAPD/INS)

- Analyze existing customer advertising, marketing & technical documentation or develop the same for customer web site
- Appropriate BA or BS degree with 3+ years' exp. in documentation development or project management
- Desktop publishing/word processing software, technical writing methodologies, & HTML features & development tools

### GRAPHICS DESIGNER - JOB CODE (GD/INS)

- Design & produce Internet web pages, defining a conceived set of functions in a multimedia environment
- BA in Visual Arts with 5+ years' exp. using project management skills
- Thorough knowledge of Photoshop, Corel Draw, & Internet

### GRAPHIC ILLUSTRATOR - JOB CODE (GI/INS)

- Design & produce computer-generated art for World Wide Web-based publishing as well as printed material
- BA in Visual Arts with 5+ years' exp.
- Working knowledge of 2+ drawing packages & Internet

### SALES ENGINEER - DATA - JOB CODE (SED)

- Design & develop network product & services implementation
- 3-7 years' exp. in LAN/WAN computer applications & sales engineering
- BS in EE, MIS or related field

### SALES ENGINEER - NETWORK - JOB CODE (SEN)

- 3-10 years' network application exp. with account management/sales skills required
- Network & CPE product knowledge & exp. with network, voice, data & video required
- Design & develop network product & services implementation

### PROGRAMMER/PROGRAMMER ANALYST, SYSTEMS ANALYST/SR. SYSTEMS ANALYST - JOB CODE (PA3)

- Develop client/server applications using object-oriented technique & design for very large RDBMS, Object base design
- Programming on mainframe, minicomputers, or risk-based systems
- 1-5 years' programming exp.
- C++, C, SQL, Oracle, Informix, UNIX, NT, Powerbuilder, Smalltalk, JAVA, Active X controls & Visual Basic; Applet develop-ment for www delivery, WIN 95
- BS/EE or MS - Computer Science



## SALES

### REGIONAL SALES MANAGER - JOB CODE (RSM)

- Source, organize, develop & manage sales force for CPE & network (voice & data)
- BS & 3+ years' exp. exceeding quota in the data environment
- Minimum 2 years' exp. managing data account reps
- Conceptual knowledge of LAN/WAN technology, ability to work with middle-, senior- & executive-level MIS managers & excellent business acumen required

### SALES REPRESENTATIVE - JOB CODE (PSI)

- 1-5 years' outside sales exp. to professional service businesses in a tele-com or high-tech environment
- BA/BS in Business or related field; Excellent communication skills

### TECHNICAL SALES - JOB CODE (BAM/AM)

- 3-5 years' consultative sales exp. in telecom environment
- BS or BA required
- Strong conceptual knowledge of voice, video, data & network technologies

### SALES TRAINER - JOB CODE (ST)

- Provide instruction for sales skills, telecommunications technologies, industry & business applications for sales & sales support personnel
- BA or BS in Business or Marketing; 3-5 years' telecom-munications sales exp.
- Computer literate; product & data communications knowledge required



## MARKETING & MANAGEMENT

### MARKETING MANAGER - RETENTION PROGRAMS - JOB CODE (MMRP)

- Design & implement GTE's long distance retention, strategic & tactical programs
- Support Marketing & Sales Dept. expense of \$140 million
- Supervise 4 direct reports
- Customer research/contact & feedback analysis
- 8-10 years' long distance/telephony/competitive market exp. required
- BA/BS required; MBA preferred
- Exp. in database marketing, retention program design, winback programs required

### MANAGER COMPETITIVE MARKETING INTELLIGENCE - JOB CODE (MCMI)

- Design & market GTE long distance competitive information process
- Forecast competitive trends
- Support acquisition program for incremental revenue of \$600 million with retention of \$1 billion regional long distance revenue
- Analyze \$85+ billion market with complex customer requirements & intense competitive activity
- Competitive analysis in intensely competitive industry
- BA/BS in Marketing required

### SR. MARKETING MANAGERS - DATA, VOICE & NETWORK - JOB CODE (SMM)

- Direct activities of product managers, network design engineers, market research & strategy employees
- Interaction with federal & state regulators, executive-level customers & GTE executives
- BS in Business, EE or Marketing required; MBA preferred

### BUSINESS PROCESS EXPERT - JOB CODE (BPE)

- Develop/maintain process mapping & flows covering the life cycle of products or services
- Develop process performance targets
- Exp. in 1 or more business areas such as billing, order entry or customer care
- Requires exceptional documentation skills, product & project manage-ment knowledge
- Requirements gathering & multi-department coordination

### STAFF MANAGER - VENDOR - JOB CODE (SM/LD)

- Perform vendor evaluation, certification, contract negotiation
- Interact with all levels of management
- EE with an MBA; or BS/BA in Business or Telecommunications
- Sales or account/vendor management exp.
- Data (Frame Relay, SONET, Private Line, ATM), Broadb&, Wireless, Video, CPE

### LONG DISTANCE NETWORK ADMINISTRATORS & MANAGERS - JOB CODE (NA/LD)

- Perform analysis of real-time network outages/incidents & implement policies/procedures for monitoring performance
- Responsible for network planning design architecture, economic network modeling, cost analysis & engineering
- Network maintenance support, network implementation control & tracking & standardization management/configuration
- BS in Telecommunications, Math, CS or Engineering
- 8-10 years' telecom exp. with 3 years in network/traffic management, planning or operations
- Strong technical knowledge in network/traffic management and/or network operations
- Cost study methods & testimony before regulatory agencies

# IT'S AMAZING WHAT WE CAN DO TOGETHER.



What would  
the Internet  
be without  
us?

Dry.  
Barren.  
Uninhabited.



Cyber-space with no organizing force to register the identities and locations of the millions of users who bring the Internet to life. A daunting and vital task of this magnitude required a resource with unparalleled expertise and experience in the most complex areas of network technology.

## Network Solutions.

Our extensive background in network problem solving, combined with our pioneering work on the Internet's protocol programming, made us the natural choice for this essential role.

By allowing the brightest minds in network technology the freedom to put their vision and talent to the test, Network Solutions has become a pre-eminent authority in our industry. If you're a network professional with the experience, drive and track-record to tackle Internet-size challenges, we urge you to examine our current opportunities.

**CHIEF TECHNOLOGY OFFICER** - Dynamic and articulate individual with established ties to the technology community. Must have Internet and Product Development experience as well as UNIX, C, NT, HTML, SUN, HP and MS hardware/software experience.

**SENIOR SYSTEM ADMINISTRATORS** - Develop and maintain C, C++, PERL and Shell scripts for UNIX system administration. Configure and maintain Sendmail, CISCO routers and SUN servers/workstations. Requires 1+ year SunOS, Solaris 2.X and/or Intel BSD system administration experience as well as knowledge of UNIX network security, Internet routing, DNS and IP networking. Relational database experience (INGRES, Oracle, Informix) and familiarity with TCP/IP and Internet tools (FTP, TELNET, web browsers) desirable.

**NETWORK MANAGEMENT ENGINEERS** - Provide management, performance, and capacity planning support through the development, deployment, and operation of complex distributed network management and performance systems and tools. Desirable experience includes: UNIX, HP OpenView, SunNet Manager, SunOS, Cshell, C, SynOptics Optivity, Cabletron LANView or Spectrum, Wellfleet Site Manager, Cisco Works, SNMP MIB v1/v2, NIS DNS, TCP/IP, and RMON.

**NETWORK MANAGEMENT ARCHITECTS** - Design and implement cost effective and efficient network management service solutions and architectures within given client parameters. Must possess working knowledge of network management service areas: Fault, Configuration, Accounting, Performance, Security Management. Should also have experience in any of the following areas: SNMP proxy, HPOV, SunNet Manager, System View AIX, SMS, SNMP v1/v2, RMON I/II, TCP/IP protocol suite, Shared LAN, Fast packet LANs, Frame Relay, Routing Protocols, and UNIX.

**IP NETWORK DESIGNERS** - Analyze client requirements and recommend, install and configure hardware/software. Design IP networks and migrate existing networks to IP. Knowledge and/or experience in the following areas required: TCP/IP (router protocols, firewalls, numbering), LAN/WANs, RMON, DHCP, BOOTP, C, UNIX Shell Script, PERL, ADP, and Cisco/Bay Networks/Wellfleet Routers.

**IP SYSTEMS INTEGRATORS** - Analyze client requirements and recommend, install and configure hardware/software. Design, install and operate TCP, DNS, SMTP servers, SMTP gateways to COTS email systems, UNIX system deployment and UNIX system security assessment. Knowledge and/or experience in the following areas required: UNIX, TCP/IP, DHCP, C, UNIX Shell Script, PERL, SMTP, and ADP.

**WEBMASTERS** - Design and maintain Web pages/servers. May also install and configure Web servers (SUN) and software. Must have experience in the following areas: UNIX and/or Windows NT script development (C Shell, PERL, TCL, etc.); commercial HTTP server software installation and maintenance; UNIX systems administration.

**SOFTWARE ENGINEERS** - Provide software development and maintenance of C, C++, OOP, OOD, PERL and embedded SQL applications under UNIX as well as TCP/IP client/server networking. Develop TCP/IP services protocol and network security. Must have a minimum of 2-3 years C/UNIX software development experience as well as knowledge of SunOS, Solaris, BSDI UNIX system administration and UNIX network security. Must have knowledge of Internet routing, DNS, and IP networking services as well as familiarity of TCP/IP and Internet tools such as FTP, TELNET and web browsers. Relational database experience (INGRES, Oracle, Informix) desirable.

**NETWORK MONITORING PERSONNEL** - Will monitor our large-scale network operations. Must be able to work flexible hours. Should have experience in the following areas: UNIX, HP OpenView, SunNet Manager, IBM NetView, NetView/6000, TCP/IP, Windows NT/95, and Mac/PC graphics software (Photoshop, Illustrator, etc.).

Network Solutions is a wholly-owned and operated company of Science Applications International Corporation, the nation's largest employee-owned high technology firm with revenue exceeding \$2 billion. We offer a competitive compensation and benefits package.

Qualified candidates attending the Atlanta Network+InterOP '96 show may apply for these positions by calling 1-800-638-9759, ext. 823 to schedule an on-site in-person interview.

If unable to attend the show, please send your resume and salary requirements, indicating position of interest, to: Network Solutions, Inc., Dept. NW-IX, 505 Huntmar Park Drive, Herndon, VA 22070; FAX#: (703) 742-4837; email: ivany@netsol.com EOE M/F/D/V.

For additional job opportunities and information, see our home page at <http://www.netsol.com> or the SAIC home page at <http://www.saic.com>

*We Make The Net Work.*

<http://www.nwfusion.com>

Go to the Careers section on Network World Fusion at the above address. Four past weeks of Networking Careers can be found under Job listing.

## LAN/WAN Specialists Needed in Research Triangle Park, NC

Positions are available immediately for qualified technical professionals with experience in WAN.

Desired  
background  
includes;

**SUPPORT  
CONFIGURATION  
CUSTOMER SERVICE  
TROUBLESHOOTING  
ROUTER MANAGEMENT  
VOICE COMMUNICATIONS**

Exposure to either Cisco, Bay, Frame Relay, Wellfleet a plus.

For more info and immediate consideration, contact our Raleigh, NC office at 800.547.5602 or fax 919.420.0571  
ComsysITS@aol.com  
Reference Code: NW9/16

**COMSYS**

4600 Marriot Drive, Suite 510 Raleigh, NC 27612

COMSYS, an IT subsidiary of CoreStaff Inc. is a \$450 million company with over 26 years of proven experience in Information Technology Consulting.  
COMSYS offers our employees challenging projects with educational opportunities and a comprehensive benefits package.  
COMSYS has a national presence, with over 21 offices.

**Programmer/Analyst:** Design and develop interfaces between financial applications and Cosmos manufacturing application; customize financial and manufacturing applications based on clients' needs; re-design old interfaces for maximum performance. Position requires bachelor's degree in Computer Science or similar major and two years prior experience in this position or as a software engineer. Prior experience must include experience with Sybase SQL Server database and Visual Basic, Power Builder, APT, and DB-Library software, as well as experience interfacing financial applications with manufacturing applications. 40 hrs/wk; 8am-5pm; salary of \$52,000.00/yr. Send resume with Social Security No. to Indiana Dept. of Workforce Development, 10 N. Senate Ave., Indianapolis, IN 46204-2277, Attn: Gene R. Replogle. Include ID#3379767 with response. Applicants must be eligible for permanent employment in the United States.

**\$480.00**

### LAN/WAN Designer

Suffolk BOCES seeks an innovative LAN/WAN Designer to join a technical staff responsible for the design, implementation and maintenance of both Local and Wide Area Networks. Must interface with clients and vendors. Responsibilities include network design, technology planning, and solving chronic technology problems. Strong technical, analytical and communication skills needed. Background in Novell and Microsoft NT network management and Internet connectivity are essential. Candidate must possess Bachelor's degree in telecommunications, computer science or electrical engineering and have seven years experience. Candidate will receive provisional Civil Service appointment and be required to take Network Communication exam when given. Salary \$58,000 with excellent benefits. Resumes by September 27th to Ms. Louise P. Patejdl, Executive Administrator of Personnel, Eastern Suffolk BOCES, 201 Sunrise Highway, Patchogue, NY 11772.



# IN THE FUTURE THEY SAY EVERYTHING WILL BE **DIGITAL.**

*And what better way to be part of the digital age than with the leading name in cutting-edge technology — Digital. As a member of our Network Integration Team, you'll play a key role in the continuing success we've enjoyed for the past twenty years with innovative ideas that are the envy of techno-companies everywhere. Like reinventing open computer networks. Networking most of the Fortune 500. And running one of the largest private global networks on the planet. Our rapidly expanding Network Integration group has outstanding opportunities for top-flight individuals who get a rush out of helping customers reach their business goals. Professionals who think of nothing better than designing, installing and managing customer networks while providing them with unbeatable multivendor solutions. If you're a visionary who can anticipate customer's needs as well as a tactician who craves hands-on exposure, read on.*

## OUR **PEOPLE** COULDN'T BE **HAPPIER.**

### **Senior Network Integration Consultants**

You will design and implement complex network integration solutions for new and existing customers and provide technical sales support as necessary. This involves analyzing customer needs as well as making product and service recommendations.

To qualify, you must possess exceptional verbal/written communication, negotiation and customer service skills; and the ability to travel overnight approximately 40% of the time. At least 5 years' experience developing and implementing LAN/WAN solutions is also essential, as is experience in one or more of the following:

- High-speed network products: hubs, routers, Frame Relay and ATMs (Bay Networks, Cisco and/or Digital Network Certification highly desired)
- Windows NT, SMS, MS Exchange, UNIX, HP Openview, Novell and/or Pathworks (Microsoft Certification highly desired)
- In-depth experience designing and implementing Internet services

**Positions are available in Atlanta and other locations across the U.S.**



**WHATEVER IT TAKES<sup>SM</sup>**

*Digital offers competitive salaries and full benefits. Please send your resume to: Digital Equipment Corporation, Attn: Network Services Staffing Manager, 5555 Windward Parkway West, Pole #P26, Alpharetta, GA 30202.*

*Fax: 770-343-0068 or E-mail: [mary.ben.beflin@mno.mts.dec.com](mailto:mary.ben.beflin@mno.mts.dec.com) See us on the World Wide Web: [www.digital.com/info/careers](http://www.digital.com/info/careers)*

*We are an Equal Employment Opportunity employer.*



Imagine a world where everything's connected. A world where seamless communications and real-time data sharing are not only possible—but commonplace.

Now, imagine bringing it all to life at Bay Networks.

Together, we can create an architecture for change. And an entirely new internetworking environment.

So redefine your career. And your future. With the company that's inspiring innovation. Bay Networks. We have opportunities for:

- Product Managers
- Systems Engineers
- Field Network Engineers
- Technical Support Engineers
- Communications Software Engineers
- Diagnostics SW Engineers
- Manufacturing Engineers
- Area Managers
- Territory Sales Representatives
- Technical Instructors

Check out our web site for a complete list of openings. We are proud to be an equal opportunity employer.



REDEFINE THE NATURE OF NETWORKING...

...REDEFINE YOUR CAREER

**Come visit Bay Networks at Booth 1536 or visit our Interview Suite in the Nile Room of the Marriott Marquis (265 Peachtree Center Avenue) on September 18, 19 & 20.**

**If you're unable to see us at Interop, please send a resume to:**  
**Human Resources**  
**Bay Networks, Inc.**  
**8 Federal Street**  
**Billerica, MA 01821**  
**Fax (508) 436-3510**  
**E-Mail: baynetworks@isearch.com**  
**(send ascii text only).**



**Bay Networks**  
 People connect with us

[www.baynetworks.com](http://www.baynetworks.com)

## HYPERCOM NETWORK SYSTEMS

### SOFTWARE DEVELOPMENT ENGINEERS

Hypercom Network Systems, a division of Hypercom, Inc. founded in 1978, is a multi-national company, headquartered in Phoenix, AZ. Hypercom provides advanced technology data communications systems and components to a wide variety of vertical markets including financial, retail, service, telecommunications, international banking, transportation and manufacturing. Hypercom competes in the fast growing legacy and LAN internetworking arena allowing diverse, geographically dispersed computing users to link voice, video, and data communications over a single integrated network. Hypercom Network Systems flagship product, the Integrated Enterprise Network (IEN) family of hybrid routers is used to build these complex systems.

If you have hands on "C" and assembly language software development experience and want to work in a project oriented environment in any of the following related areas:

**SNA/X.25/HDLC/SDLC/LAN/ATM**  
**FRAME RELAY/ETHERNET/TOKEN RING**

Please contact us for immediate consideration. Fax your resume to (602) 504-4578 or mail to:

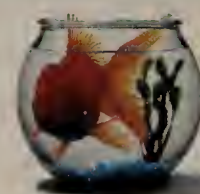
#### HYPERCOM

2851 W. Kathleen Rd.  
 Phoenix, AZ. 85023  
 Principals only please.

All positions located in Phoenix, AZ. Hypercom is an EOE.



### REGIONAL ACCT. MANAGERS SENIOR PRODUCT MANAGER



Growth Happens.

ADC Kentrox's innovative line of ISDN/Frame Relay routers prompt us to seek four highly motivated professionals for our next generation product line.

**Regional Account Managers:** Qualified Sales professionals will have 2 to 3 years direct technical sales to ISPs, carrier and end-user markets. Successful candidates will have intimate understanding of the Internet; knowledge of routers, ISDN, Frame Relay, TCP/IP, IPX and xDSL. Three positions available: California, Chicago and New York. Reference Job #830.

**Senior Product Manager:** Qualified candidates will have a degree in Business, Marketing or Engineering with a minimum of 5 years relevant product management experience within data or telecommunications. Responsibilities include: forecasting, customer presentations & other life cycle product management. Reference Job #803.

Please send your resume including salary history to: **ADC Kentrox, P.O. Box 10704, Portland, OR 97296-0704** or e-mail to: **resume@kentrox.com**. The company is committed to providing a drug-free work environment. Employment offers are contingent upon successful completion of a physical and drug screening. An Equal Opportunity Employer.



The Network Access Company™



Network Support Specialist II responsible for managing two departmental TCP/IP open systems LANS; design, install and implement LANS using 10-Base-T cabling, punchdowns, patch panels, concentrators, router, protocol analyzer and AutoCad; install software and hardware for SUN (Solaris 2.3), NEXT and DEC workstations and PCs and Macs; manipulate data (SPSS, Fortran, C, Pascal, Paradox, Excel); support and teach users; make cables; perform animal surgery; design and implement electronic circuits and boards. Bachelor of Science in Biomedical Engineering. 1 year experience (6 months experience in system administration, integration, LAN management and software development and 6 months experience in anatomical studies of hearing development in animals and behavioral studies in stereo development in humans). \$30,000 annual salary, 40 hrs/wk. Apply at the Texas Workforce Commission, Houston, Texas, or send resume to Texas Workforce Commission, 1117 Trinity, Room 424T, Austin, Texas, 78778, J.O. #7212090. Ad Paid by an equal opportunity employer.





*U.S. Robotics intends to make the metaphor of a Global Community a reality. We are a billion-dollar company and the leading provider of end-to-end access solutions, from shirt pockets, laptops and desktops to corporate data centers. Recognized worldwide for our modems, we supply the systems that Internet service providers, online services and corporate data centers use to manage their remote access traffic. These accomplishments are only the beginning of our plan to revolutionize the way people and businesses communicate.*

# Global Blueprint: Success

**The Network Systems Division** serves Internet service providers, online services, corporations, institutions and regional Bell operating companies. We provide remote or mobile users with seamless access to information by connecting them to LANs and WANs. We seek world-class professionals who want to explore a new universe of career opportunity with our Chicago-based organization.

**Software Test Engineers:** Your BSEE or BSCS and 3-6+ years of networking experience are critical in this position where you will be developing and creating test platforms for product regression/stress testing. Knowledge of communication and routing products, UNIX systems and C/C++ experience essential. (Job Code: DQTE)

**IP Router Development Engineers:** Experience with software development and implementation on IP routers required. A MSCS or equivalent and 1-10+ years of industry experience essential. Technical competence with TCP/IP and routing protocols a must. (Job Code: IP)

**ASIC Hardware Engineers:** 10+ years proven track record in development of rack-based embedded systems required. Must have 4+ years of digital logic design for microprocessor-based cards, 2+ years with EPDL, Altera, Xilinx, PAL, memory and peripheral design experience. A background in high performance systems a must. (Job Code: EHE)

**Senior Embedded Hardware Engineers - Processor Core Design:** Consists of: high speed bus design (up to 66 MHz), L2 cache and high speed system memory. Design experience with these processors desirable: Pentium-Pro processor and related chip set, PC peripheral components and PCI local bus design. Experience with Digital Access Interface, PLD and FPGA devices required. Altera and Xilinx devices, VHDL, Synopsis tool set, and Viewlogic a plus. (Job Code: SEHE)

**Senior Software Engineers - Packet Network Technology:** The senior engineer with 7+ years experience developing X.25, Frame Relay or ATM products is right for this position by utilizing network access technologies. Experience with embedded, real-time "C" analysis and implementation a must. A background in a WAN hub environment essential. (Job Code: SSEP)

**Wireless/Cellular Software Engineers:** The software product developer with two or more years experience in tele/data communications is right for this position. Experience with cellular and/or wireless communications essential. C++ and OOD a plus. (Job Code: WCSE)

**Senior Software Developers:** Work with a development group providing UNIX-based systems for testing communication hubs. Solid knowledge of UNIX tools, C programming, interprocess communication and I/O required. LAN/WAN knowledge and project leadership experience necessary. (Job Code: SSD)

**T1/E1 Software Developers:** Your background with 2 or more years experience in embedded system development in a communications environment essential. Experience with VRTX is helpful. (Job Code: T1/E1)

**DSP Engineers:** Your experience writing DSP software for signal applications essential. Modem development, voice compression and video processing experience desired. BSEE required, MSEE preferred. (Job Code: DSP)

**Multimedia Systems Manager:** Manage the development of embedded software for LAN, dial-up voice and video systems. Embedded software development experience and knowledge of "C" programming and real-time operating systems essential. Requires a BSEE/CS or related field and 10+ years industry experience. (Job Code: MSM)

**Senior Software Engineers - X.75:** Develop protocols in X.75 and embedded systems programming. Experience in ISDN or X.25 helpful. BSCS required, MSCS helpful. 5+ years experience and "C" programming skills essential. A background in IP router product development and full product life-cycle a must. (Job Code: SSE-X75)

*Give your career a global plan for achievement.* As we challenge your professional abilities and reward your personal contributions, we offer excellent salaries, continuous learning opportunities, benefits featuring a 401k plan, bonus programs and a casual workplace. Send/fax/e-mail your resume, complete with salary requirements, in confidence to: **U.S. Robotics, Network Systems Division, Human Resources, Attn: (NW/JP - Job Code), 8100 N. McCormick, Skokie, IL 60076. Fax: (847) 676-6662. e-mail: jpappas@usr.com.** U.S. Robotics is an equal opportunity employer rich in diversity.

# U.S. Robotics®

The Intelligent Choice in Information Access  
NETWORK SYSTEMS DIVISION

**Locations:** A global company, USR is headquartered in Skokie, Illinois, with offices and opportunities in Westborough, Massachusetts; Salt Lake City, Utah; Los Altos, California; Vienna, Virginia; Grass Valley, California; Milan, Italy; Munich, Germany; Dublin, Ireland; and subsidiaries in Lille, France and near London, Paris and other European cities.

Link Up To Our Website: [www.usr.com](http://www.usr.com)



## IF TECHNOLOGY KEEPS MOVING FORWARD WHAT'S HOLDING YOU BACK?

Thanks to computers, companies have more information about their business than ever. But they often seem to know *less* about what customers really want. All that data, in all those computers, is hard to access. And hard to use for making decisions. What's needed are ways to help companies manage information as a business asset that contributes to success. Unisys provides those kinds of solutions. A Fortune 100 industry leader, we currently have **national opportunities** available for forward-thinking, technical professionals ready to move ahead with a leader.

### Principals, Senior Managers & Networking Consultants

We seek professionals with proven consulting experience specific to one or more of the following: network management services; LAN/WAN architecture & implementation; desktop services; web site integration; mobile computing implementation; voice network implementation; multimedia network integration. Some positions require a CNE with Windows NT-Migration experience.

Individuals with broad-based experience, having led and managed through all phases including project proposals, team building, project management, skills acquisition, design and implementation, will thrive in this environment.

### Network Design Consultant

In this pre-sales assignment, you will analyze client network requirements and provide network solutions that operate across multiple platforms. A minimum of 3 years experience in any combination of the following: LAN/WAN/MAN network systems; planning, design, evaluation & selection of operating systems/protocol suites; best of breed, multivendor network products (routers, bridges, concentrators, hubs & NICs); TCP/IP, IPX/SPX, Appletalk in a distributed client/server environment; ATM, ISDN, X.25, FDDI, Ethernet, Token Ring, Frame Relay; interoperability testing; professional networking certification.

### Network Implementation Support Engineers

Use your network hardware/software expertise to enable individuals to install various network configurations. Requires experience in the following areas: implementation of diverse network configurations; network products such as routers, hubs & Novell; CNE certification; trained on Wellfleet & Cisco routers; synoptics hubs knowledge; client interaction on all phases of network implementation; project management.

### Network Center Operations (Blue Bell, PA Opportunities)

Your 3-5 years experience should include routers and hubs, as well as training and utilizing network management tools, TCP/IP, LAN technologies, WAN technologies, routing protocols. Prior experience in a network operations center preferred.

If you're looking to join an organization on the leading edge of information technology, partner with **Unisys Corporation**. As a member of our team, you will receive a highly competitive salary and comprehensive benefits package in an environment that encourages both personal and professional growth. To apply, please respond using one of the following options: **e-mail: [recruit@po1.bis.unisys.com](mailto:recruit@po1.bis.unisys.com) (no file attachments); mail: Unisys Corporation Employment Response Center, Worldwide Recruiting & Staffing, Dept. NWW091696, P.O. Box 5591, Bismarck, ND 58506-5591. For consideration, you must reference the Dept. #.** We are an equal opportunity employer committed to work force diversity.

# UNISYS

THE INFORMATION MANAGEMENT COMPANY

<http://www.unisys.com>

## THE COUNTDOWN HAS BEGUN.

APPLY NOW!

RELTEC Corporation, a leading supplier of Integrated Telecommunications Access, Test Systems and ADSL products is now opening the doors to these unequalled opportunities.

Software  
Engineers

Automation  
Test Engineer

Systems  
Software  
Architects

Hardware  
Engineers

Manufacturing  
Engineers

Technical  
Writers

[www.relteccorp.com](http://www.relteccorp.com)

Interested candidates should forward resumes to: RELTEC, Recruiter-NW, 2100 Reliance Parkway, Bedford, TX 76021; Fax: (817) 540-9729. EOE M/F/D/V.

# RELTEC™

## HERE'S YOUR ticket to our INTERVIEW

Enterprise Networking Services is expanding nationwide!

Already the leader in LAN/WAN integration and local frame relay services, **!ENTERPRISE Networking Services from U S WEST** offers Transparent LAN

Services to connect Ethernet or Token Ring LANs at native LAN speed, along with state-of-the-art hardware from Cisco, Bay Networks, ADC Kentrox, Ascend, 3Com and Motorola.

We have broadly available ATM and offer a premier Internet service platform through our partnerships with Microsoft, Lotus Notes, Cisco, Sun and Ascend.

So, if you're going to InterOp, come on by and learn more about our opportunities nationwide. See if our vision aligns with where you're steering your career.

### Data Networking Professionals

Plan, design, market and implement our next generation solutions to business and government customers. **!ENTERPRISE Networking Services from U S West** has rewarding positions for Account Managers, Sales Engineers, Project Leaders and Sales Directors available nationwide.

**Account Manager, Sales Engineer and Sales Director** candidates should have significant sales and technical design experience in systems and network integration. Experience will include all WAN technologies and LAN hardware, such as routers, switches, etc. Knowledge of Frame Relay, ATM, SONET, TCP/IP, IPX, and Internet is also desired.

**Project Leader** candidates should have hands-on experience implementing the above technologies, complemented by troubleshooting skills with diagnostic tools such as a protocol analyzer.

So, bring your resume and join us at InterOp '96 at our Hospitality Room:

Tuesday Sept. 17, Zurich Room  
(Conference Level, Meeting Cluster #3)

& Thursday Sept. 19, Riviera Room  
(Garden Level, Meeting Cluster #5),  
5PM-8PM Both Days,  
Atlanta Marriott Marquis Hotel.

If unable to make it to Network+InterOp '96, FAX your resume to National Recruiting Manager at (503) 425-3390; or e-mail: [ameeker@uswest.com](mailto:ameeker@uswest.com). For more information about these and other data networking opportunities, see us on the web: <http://www.careermosaic.com/cm/uswest/home.html> An equal opportunity employer.

# !ENTERPRISE

NETWORKING SERVICES FROM U S WEST

## DON'T MISS THESE GREAT ADVERTISING OPPORTUNITIES IN OCTOBER

ISSUE	SPECIAL FEATURE	SPACE CLOSE
10/7/96	BONUS DISTRIBUTION: UNIX EXPO, NY and NETWORK+INTEROP, Paris	
	BUYER'S GUIDE: ATM Services	9/25/96
10/14/96	WEB SERVERS	10/2/96
10/21/96	WANs Quarterly Broadband Ticker	10/9/96
10/28/96	BONUS DISTRIBUTION: NETWORKS EXPO, Dallas	10/16/96

For more information or to place an advertisement, please call Pam Valentinas at 1-800-622-1108.



# Right Here. Right Now.

**Novell gives remote users  
the ability to connect to  
the network from their  
laptops, home PCs, and  
one day, even the TV.  
Information  
anytime, anywhere.**



A seamless, transparent connection that enables you to access a network over phone lines and power lines. Technology so simple to use, it will virtually blend into the background of our lives. That's the future of networked computing. And as the only software company singularly focused on networked computing, Novell is positioned to bring this vision to life. Right here. Right now.

The gateway is already underway. There are over 50 million people worldwide connected to Novell networks. By the year 2000, our goal is to have one billion people connected to a single network; a Novell Smart Global Network. The Smart Global Network will grant people access to information no matter where it resides - on the Internet, on a laptop, in the car, or at home. Securely and easily. Until everything's connected.

This could be your chance to join Novell at our Utah or San Jose, CA facilities. To pioneer technology today, that will address the networked computing needs of tomorrow. Make the connection.

- **Software Engineer,  
Windows NT/95**
- **Internet Infrastructure  
Engineering Manager**
- **Business Development Manager**
- **Marcom Writer,  
ManageWise**
- **Sr. Technical Writer,  
ManageWise**
- **Project Development Manager,  
ManageWise**
- **Software Test Engineers,  
NetWare Utilities**

- **Product Marketing Manager,  
Market Segment-PC LAN**
- **Product Marketing Engineer,  
Directory Services**
- **Product Marketing Engineer,  
Internet Infrastructure**
- **Software Developers,  
Internet Commerce**
- **Technical Writers**
- **Editors**
- **Product Marketing,  
Internet Commerce**

As a global organization, Novell offers you a world of career opportunities. To learn more, connect to [www.novell.com](http://www.novell.com); or e-mail your resume in ASCII format, **INDICATING JOB CODE CANETJM19**, to: [resume@novell.com](mailto:resume@novell.com); fax 1-800-688-9931; or mail to: Novell, Inc., Human Resources, 1555 N. Technology Way, Orem, UT 84057.

Novell is an equal opportunity employer and as such encourages diversity, creativity, and fosters an environment where all people are rewarded for their talents and contributions.



**Novell®**  
Everything's Connected™

[www.novell.com](http://www.novell.com)

Trademarks are registered to their respective companies



# ON SITE **Frills** and **NETWORKING** **Thrills**

ONE FOCUS: *providing businesses in more than 175 countries with the ultimate networking solution. One choice: the organization with a reputation for effectively providing business information and network services to major corporations. Of course, we're talking about the Network Services Division of CompuServe.*

*When you join CompuServe in Columbus, Ohio, you're setting yourself up for a thrilling career and an incredible metropolitan lifestyle. As the 16th largest city in the nation, Columbus is the affordable community that combines sophisticated cultural attractions with endless opportunity. The result - all the on-site frills that make life exciting and enjoyable.*

We offer competitive salaries and attractive benefits, which include relocation and tuition assistance. If you are unable to attend the Network World Career Fair, please forward your resume, complete with salary requirements, to our World Headquarters: CompuServe, 5000 Arlington Centre Blvd., Columbus, Ohio 43220, Attn: ADNW 7062 or send via CompuServe mail to 76516,1173 or via the Internet to 76516.1173@compuserve.com EOE.

**See us at the Network World Career Fair at  
Networld+Interop '96,  
Georgia World Congress Center,  
September 18 - 20**

*The following positions are open at our World Headquarters in Columbus, Ohio.*

- Software Developers
- Internet Product Specialists
- User Interface Designers
- Technical Writers
- Quality Test Specialists
- Network Product Specialists
- Network Product Managers
- Network Product Analysts
- Network Support Technicians
- Network Planning Analysts
- Network Designers
- Network International Marketing Managers
- Marketing Communications Specialists
- Online Services Editors



**COMPU SERVE  
NETWORK SERVICES**



## TransPortal Pro... a new look in Connectivity!

For Users, **TransPortal PRO™** is a new look for the mainframe.

For Developers, it's results in the blink of an eye.

Develop Customized PC based front ends for Mainframe and Mid-range applications using **TransPortal PRO**. Create Cooperative and Distributive processing applications, making host applications flexible and easier to use.

Use PC development tools that you already know, like **Borland Delphi™**, **Visual Basic™**, **PowerBuilder™**, **FoxPro™**, **Visual FoxPro™**, **CA Visual Objects™**, **Gupta's SQLWindows™**, **Paradox for Windows™**, **dBase 5™**, **ObjectVision™**, **Access™**, **CT™**, **Turbo C™**, **C++™**, **Clipper™**, **QuickBASIC™**, **Clarion™**, **Micro-Focus Cobol™**, **REXX™**, **VXREXX™**, and others to write the user interface.

**TransPortal PRO** works with 3270, 5250, and VT100/220 emulators and runs under DOS, Windows, Windows NT, and OS/2. Increase development productivity and retain existing data security and integrity.

No additional host software or code changes are required!

Call Now for a **FREE Demo Disk 1-800-548-5660!**



We deliver productivity through connectivity.  
**The Frustum Group, Inc.**  
525 North Broadway, White Plains, NY 10603  
(800)548-5660 OR (914)428-7200 FAX: (914)428-0795  
HTTP://www.Frustum.com

TransPortal PRO is a registered trademark of The Frustum Group, Inc. Other product names are trademarks of their respective companies.

Reader Service No. 257

# Marketplace

The Hub of the Network Buy

## Free Product Information

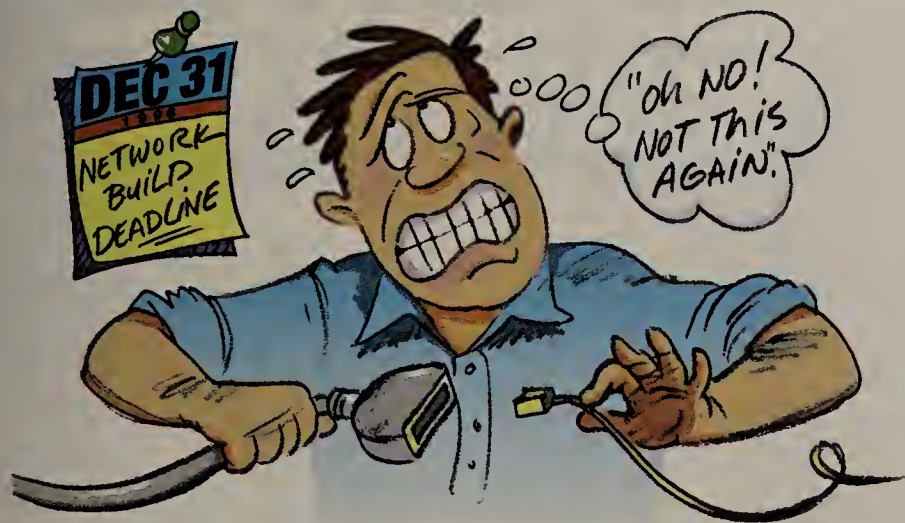
To receive more information circle the reader service numbers of products that interest you.

Send this coupon to: Network World P.O. Box 5090, Pittsfield, MA 01203 or Fax (413) 637-4343, or use the prepaid card elsewhere in the issue.

Expires 12/16/96

Name:	217	218	219	220	221	222	223
Title:	224	225	226	227	228	229	230
Company:	231	232	233	234	235	236	237
Phone: ( )	238	239	240	241	242	243	244
Street:	245	246	247	248	249	250	251
City:	252	253	254	255	256	257	258
State:	259	260	261	262	263	264	265
Zip:	266	267	268	269	270	271	272
	273	274	275	276	277	278	279
	280	281	282	283	284	285	286
	287	288	289	290	291	292	293
	294	295	296	297	298	299	300
	301	302	303	304	305	306	307
	308	309	310	311	312	313	314

9/16/96



Maybe it's time you tried an intelligent network design tool.



Cables don't match. Parts weren't ordered. Devices aren't compatible. If these problems sound familiar, you should try NetSuite

**Professional Design software.** It has intelligence built right into it, so you get your network design right the first time, meet your schedules, and keep the users happy. Call now, and take the frustration out of network design once and for all.

- Validates your network designs, devices and media
- Automatically creates professional-looking diagrams
- Generates work orders and bills of materials
- Recommends devices that meet your design criteria
- Lets you publish designs on your Web server (optional)

**BEST OF LAN TIMES**  
1996

- Includes library with thousands of LAN/WAN device models from over 75 vendors

Call **1-800-NetSuite**  
(1-800-638-7848)

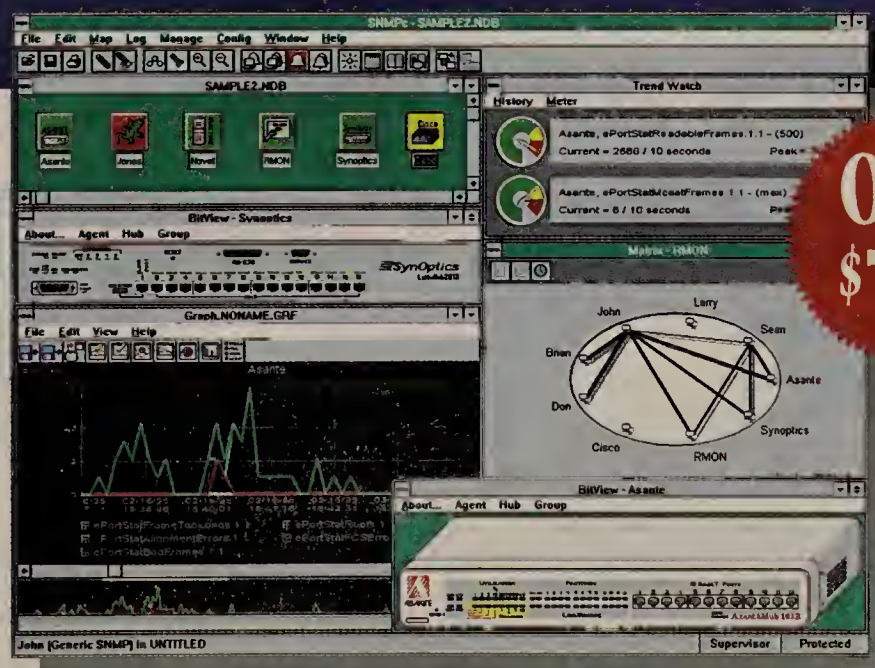
**NetSuite**  
Intelligent Network Design

321 Commonwealth Road, Wayland, MA 01778 • <http://www.netsuite.com>

See us at Interop,  
Booth 3140

# SNMPC

## Network Manager for Windows



**Only \$795**

- Full RMON Support
- Integrates with HP OpenView
- TCP/IP, Telnet, TFTP, BOOTP
- WinSNMP/WinSock/DDE APIs
- SNMP, ICMP, IPX Polling

- Node Discovery
- Long Term Statistics/Thresholds
- Custom Event Actions/Forwarding
- Over 100 Device Specific GUIs
- MIB Compiler/Browser




**Castle Rock**  
Computing

**408-366-6540**  
Fax: 408-252-2379

Reader Service No. 252



Attention  SynOptics System 3000 Customers

## New Ethernet Desktop Switching, Shared Fast Ethernet Modules, and

### A Special Limited Time Offer For System 3000 Customers Only!

Visit our Web site at: <http://www.baynetworks.com/s3000>  
or call 1-800-231-4208 or your local reseller for more details.



Bay Networks  
People connect with us

## A Great Buy Opportunity!

© 1996 Bay Networks, Inc. "People connect with us" is a trademark of Bay Networks, Inc.

Reader Service No. 236



## It's an Open and Shut Case...

### for Great Lakes.

File Server and Data Cabinets designed to meet your Network Management storage requirements. We provide LAN Cabinets that feature solid metal frame construction and sophisticated modularity. Allow your Operating System to be the best!

Great Lakes preassembles cabinets to meet your exact specifications. Let us address

your LAN environment applications using various 19", 23" and 24" rack mount widths, File Server Racks, Wall Mount Cabinets and Cable Management Systems.

- Value that counts
- Wide selection of features
- Preassembled to ease installation
- Guaranteed, on-time delivery
- Great Lakes Quality

Only Great Lakes can provide the fit, the quality and features you need on time.  
**Insist on Great Lakes Quality!**

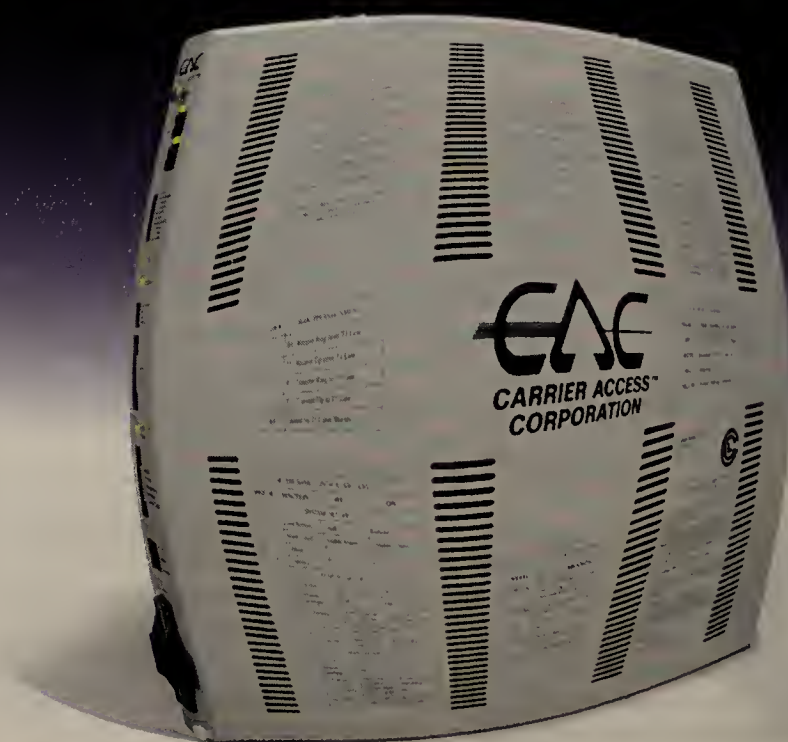
**Great Lakes**  
case & cabinet co., Inc.

Corporate Headquarters:  
P.O. Box 551, Edinboro, PA 16412  
814/734-7303, Fax 814/734-3907

Western Distribution:  
3875 Corsair Street, Suite "O", Reno, NV 89502  
702/829-9913, Fax 702/829-9926

Reader Service No. 305

**With all these features,  
our T1 Channel Bank  
should look like this.**



The **Access Bank II T1 Multiplexer** easily links remote offices, provides digital Internet access up to 50 times faster than today's fastest modems, and helps you access competitive long-distance services—**with a pay back in months, not years.**

**Call now to get high performance, feature-filled, low cost T1 Access!**

**1-800-495-5455**

Please visit Carrier Access at  
<http://www.carrieraccess.com>

- Dual T1 interfaces
- High-speed digital data ports (up to 1.5Mbps)
- Drop and insert
- Protection switching/route diversity
- Digital cross connect
- Up to 24 analog voice lines

**CAC**  
CARRIER ACCESS  
CORPORATION

5395 Pearl Parkway, Boulder, Colorado 80301

Reader Service No. 251



# Buy One & Get Two Free.

Only SuperTCP Suite 96 from Frontier Technologies lets you migrate from Windows 3x to 95 or NT absolutely free. Simply upgrade to the new platform by reinstalling the SuperTCP Suite 96 CD. With over 40 TCP/IP applications, including NFS Client and Server, several Terminal Emulators like VT320 and tn3270, X-Server, plus complete

Internet Access, SuperTCP Suite 96's modular structure allows you to license only what you need.

What's more, Frontier Technologies provides you with the best technical support in the industry. Call Frontier Technologies today for your free demo of the most award-winning TCP/IP package, and see for yourself why Super TCP Suite 96 is your one stop TCP/IP solution.



Available through these quality distributors:



1-800-237-8931



1-800-456-8000



1-800-GBC-WINS



(800) MERISEL



1-800-875-0068



1-800-461-8649  
IN CANADA

LAN Magazine's Product of the Year Award Winner 3 years in a row. One of two major awards this year!



**For a free demonstration copy, call 1-800-929-3054**

email [info@frontiertech.com](mailto:info@frontiertech.com). <http://www.frontiertech.com> <ftp://www.frontiertech.com>

© 1996 Frontier Technologies Corporation. All product names are Trademarks of their respective companies.

**Free WYSIWG Web  
Page Designer -  
[www.frontiertech.com](http://www.frontiertech.com)**

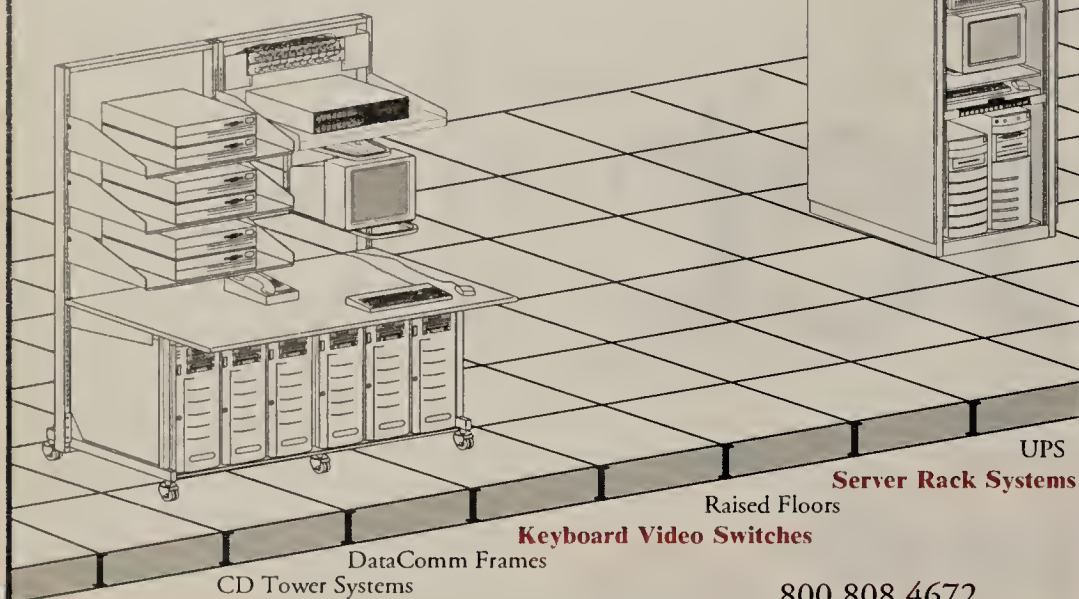


Are you spending too much time with  
too many vendors?

## Tron International, Inc.

Being an IS Professional today sometimes requires you to provide facilities management services for your lab. Because network requirements can overwhelm your day, you don't have time to become a facilities expert. Tron is one vendor who supplies several brands, and has the experience in designing computer rooms to optimize your time and effort.

### Expand Your Options With A National Supplier



#### Cabinet Enclosures

There are more than fifteen manufacturers of rack and cabinet systems, and eleven that supply keyboard/video switches. Each vendor promotes their own products whereas Tron can give you complete unbiased comparisons of several products all at once. We'll assist you with designs that optimize the way your lab works.

800.808.4672

**24 Hour QuickQuotes™**  
Fax your Spec's to 415.525.2707  
E-Mail: info@tron.com

**TRON**  
INTERNATIONAL, INC.

Reader Service No. 233

## Up to 4 Users Can Access Multiple PC, Macintosh, and Sun Computers from a Central Location!

### Multiplatform

Supports any combination of PC, Macintosh, and Sun computers. Use any platform's peripherals to access any type of computer in the system.

### Multiuser

Up to 4 users can access different computers simultaneously!

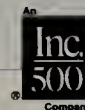
### Multimedia

Every user has full multimedia capabilities; keyboard, mouse, video, microphone, speakers, and serial support available.



## AUTOBOOT COMMANDER 4XP™

Cybex Computer Products Corporation  
4912 Research Drive  
Huntsville, AL 35805  
1-800-932-9239 (205) 430-4030 fax  
<http://www.cybex.com>



Cybex, Commander, AutoBoot and 4xP are trademarks of Cybex Computer Products Corporation. Sun is a trademark of Sun Microsystems. PC and Macintosh are registered trademarks of their respective holders. The Inc. 500 logo is a registered trademark of the Goldhirsch Group.

Dealer Program Available

Made in the USA

Reader Service No. 227

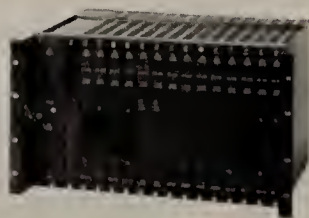
## Now you can rearrange T1/E1 circuits remotely...



With a switch that costs  
less than \$110 per port!

You no longer have to dispatch someone to move lines around or connect test equipment. With the TMX Matrix Switch, you simply point and click. The switch makes the changes, initiates the testing and documents what you did. And, our Windows™-based client/server management software gives you control from anywhere you can plug in a PC.

The TMX is inexpensive and it's small, too. A switch with 128 T1/E1 ports occupies only 10 5" of rack space. For more information on the TMX Matrix Switch, call 800-806-7680 or write Linear Switch Corporation, 225 Executive Drive, Moorestown, NJ, 08057.



**Linear Switch Corporation**

Reader Service No. 293

## GET IN THE KNOW

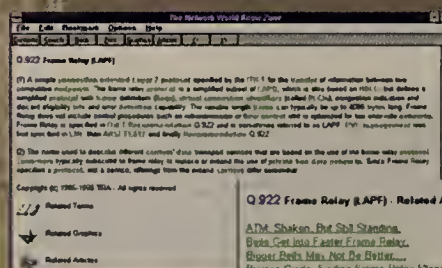
The Know Zone™ is Network World's all-new interactive glossary of networking and communications terms. You'll get clear descriptions of technical terms, comprehensive explanations of acronyms and a fast and reliable escort through the techno-babble jungle.

The Know Zone comes jam-packed with:

- Over 2,500 expertly-defined terms, plus their acronyms
- Hypertext / Full-color Hypergraphics throughout, with almost 30,000 hyperlinks
- Thousands of links to related Network World articles
- Immediate access to a vast library of information
- Annotate and bookmark capabilities for complete customization
- Runs on Windows or Macintosh

**SO GET IN THE KNOW!**

Get The Know Zone today for  
only \$49!



Call 800-643-4058  
or 508-820-7493 to order!

Reader Service No. 247



# Don't Compromise on Network Performance

## Printer Servers



First with flash-based true, simultaneous, multi-protocol HP MIO-compatible (NETJet™) and external (NETQue™) printer servers. Improving overall network performance by minimizing unnecessary traffic.

## WAN Adapters



Close to 3 million ports installed worldwide providing news, stock quotes, travel reservations, lottery tickets and ATM (yes, automated teller) transactions to millions of people daily...shipping solutions since 1983. Introducing DCP\_link, providing wide area connectivity for NetWare environments, and a PCI 2, 4 and 8 port WAN adapter.

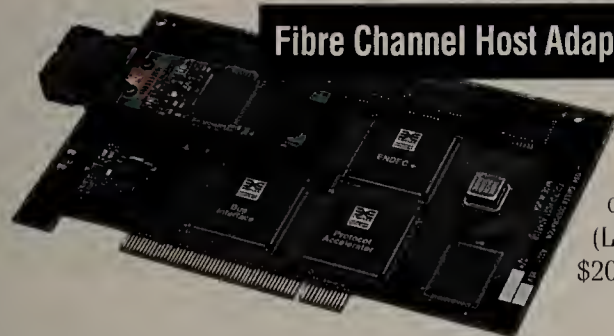
ConnectPlus™ 2 or 8 Port remote access solutions for client-to-LAN connectivity over TCP/IP, IPX and AppleTalk. Dial-in/out features, automatic-configuration and support for ISDN.



## Remote Access Servers

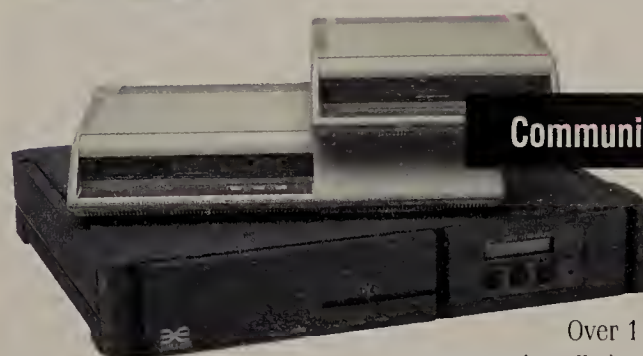


## Fibre Channel Host Adapters



Emulex is FIRST to announce a 1 gigabit fibre channel adapter (LightPulse™) for less than \$2000 list.

## Communications Servers



Over 1 million comm/terminal server ports installed worldwide in some of the world's "toughest" networks.

Go with a proven leader...  
**1-800-EMULEX1**



e-mail: [literature@emulex.com](mailto:literature@emulex.com)  
Internet: <http://www.emulex.com>  
Costa Mesa, CA (714) 662-5600  
Wokingham, U.K. (44) 118 977 2929



Munich, Germany (49) 89 96  
Paris, France (33) 1 69 41 90 1  
Wanchai, Hong Kong (852) 2  
Manly, Australia (61) 2 9976

\*NETQue Mate \$329 U.S. list while supplies last

This ad refers to various companies and products by their trade names. In most, if not all cases, these designations are claimed as trademarks or registered trademarks by their respective companies.

KEY CODE: 97-010



Go for  
the Green  
with Emulex

Booth #4056

Network+Interop  
'96 Atlanta



# TOTAL INTERNET RELIABILITY

Introducing two bright new stars in the digital universe:

**WANMASTER TI and WANMASTER BRI**

ASTROCOM's expanded family of CSU/DSUs and Terminal Adapters spell *INTERNET PERFORMANCE*.

- Models for all bandwidths: ISDN, DDS, and T1
- New SNMP & Telnet Network Management support on WANMASTER
- Remote configuration
- Solutions for leased lines and dial up services
- All day, every day technical support
- 5 year overnight replacement warranty standard
- Exceptional reliability and data integrity

**ASTROCOM**

UNITING THE DIGITAL UNIVERSE

ENABLING TECHNOLOGIES FOR:

• Internet • Distance Learning • Telemedicine • Video Conferencing • Data/Video/Voice  
CSU/DSUs • ISDN Terminal Adapters • Intelligent Statistical Multiplexers • Serving Telecommunications Since 1968

Reader Service No. 237

800-669-6242 • 612-378-7800  
Fax 612-378-1070 • [www.astrocorp.com](http://www.astrocorp.com)

# RADCOM Keeps ISDN Clean!

Dual Action WAN/LAN/ISDN Analyzer spots problems on both sides of the network!

ISDN - Dual Channel

Simultaneously monitor

both sides of the network

Test over 160 protocols:

Frame Relay, SMDS, ISDN...

All popular interfaces

PPP/Async

Easy to use Windows GUI

DataKit support

Less than 5 pounds



**RADCOM**

Phone: 1-800-RADCOM-4 201-529-2020 Fax: 201-529-0808  
E-Mail: 74777.3702@compuserve.com Web Site: <http://www.radcom-inc.com>

Reader Service No. 300



**IT'S A WHOLE NEW WORLD**

And it's a world with a new networked face.

A face which will give us better vision.

A new way to share, to learn, to explore.

The center of this world is TCP/IP. Microsoft recognized this by adding TCP/IP to Windows 95.

We've made and sold a million units of TCP/IP, so why are we pleased with this change?

We saw it coming and focused on building the best services to use this new Microsoft standard. Why? Because Microsoft's TCP/IP is a fine technical achievement, but the standard services provided (telnet, for example) are very..., well..., basic.

Our ICE.TCP™ services are first-rate, and support all versions of Windows.

ICE.TCP connects PCs to the new world with true Wyse 60, SCO ANSI (and other) terminal emulation, in color, with function keys and editing keys. Mouse-driven file transfer, inter-print, and ready for business on the Internet.

ICE.TCP: a set of visionary tools that will finish the revolution Microsoft has started.

**James River Group**



125 N. First St., Minneapolis, MN 55401 USA  
Tel 612 339 2521

[info@jriver.com](mailto:info@jriver.com) [www.jriver.com](http://www.jriver.com)

ICE.TCP is a trademark of James River Group Inc

## Finally...LAN To Internet Security Made Easy!

Integrated hardware & software solutions



Firewall

+



Connectivity



E-mail

+



Remote Access

=

Firewall, routing, e-mail, and remote access in a single, easy-to-use system!

**Built-in** Application-level proxy for maximum security.

**Built-in** ISDN or Frame Relay/T-1 router. 28.8Kbps also supported.

**Built-in** SMTP and POP servers for local control of e-mail.

**Built-in** Telecommuter module enables home & mobile users to dial in to your site.

**Built-in** Web-based tools for simplified set-up and management of all functions.

The **AFS 2000** enables your growing business to enjoy the benefits of a secure LAN to Internet connection without the cost or complication! Call now for our Introductory offer!



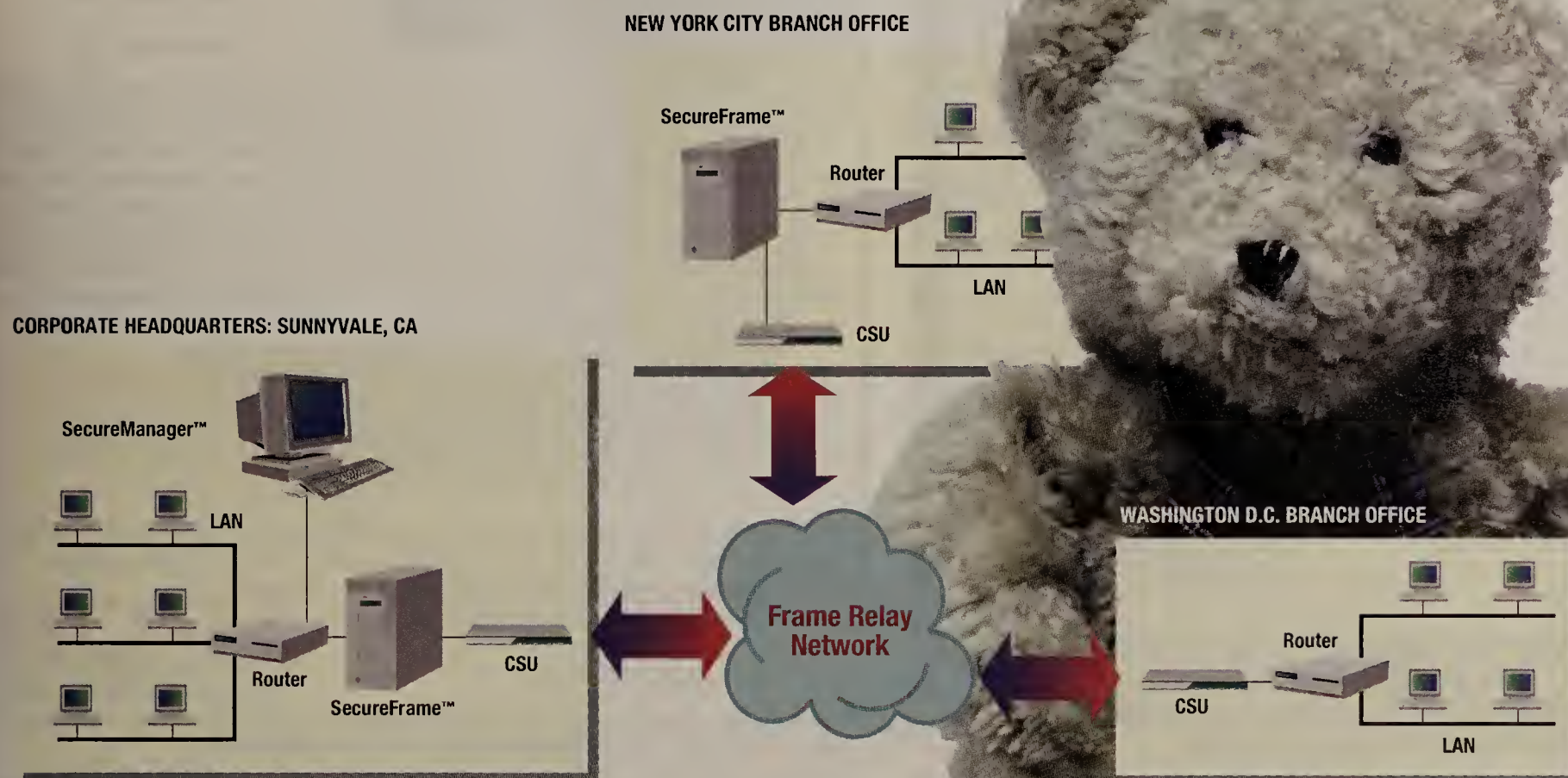
Connect with security

**AbhiWeb Corporation**  
(888) 237-2244 [www.abhiweb.com](http://www.abhiweb.com)

Reader Service No. 289



# IS YOUR FRAME RELAY NETWORK INSECURE?



## Secure it with SecureFrame™

You can save a bundle by moving to frame relay. But your network becomes less secure as you transmit sensitive data over a shared environment.

SecureFrame from Cylink Corporation is the only security product offering internationally-recognized information security standards for Privacy, Integrity and Authentication. SecureFrame's superior network management combines ready compatibility with long-term scalability across any public or private frame relay network. Security policy management enables a virtual private network (VPN) utilizing flexible, fully-automated key management. The unit is easy to maintain and operates transparently, having no noticeable impact on users, applications, or network performance.

## Delivering network security since 1984

Cylink has been the leader in WAN security since 1984, providing a complete line of network security products which combine hardware and software into a single package. Twelve years and thousands of installed security devices later, Cylink's reputation for reliability, service, and support remains unsurpassed among Fortune 500 companies, financial institutions, and government agencies.

Don't wait. . . move to frame relay and save. Call Cylink today or visit our web site.



Cylink offers sales and service through a worldwide network of direct sales and business partners.

910 Hermosa Court, Sunnyvale, California 94086 Tel: 408-735-5800 Fax: 408-720-8294  
Fax on Demand: (USA)800-735-6614 (#257) (Int'l.)408-735-6614 (#257) E-mail: info@cylink.com <http://www.cylink.com/>



# WIRE-SPEED 10 TO 155 MBPS

freespace  
freespace turbo  
freespace lite



WINNER

Data Communications LAN Times

BEST

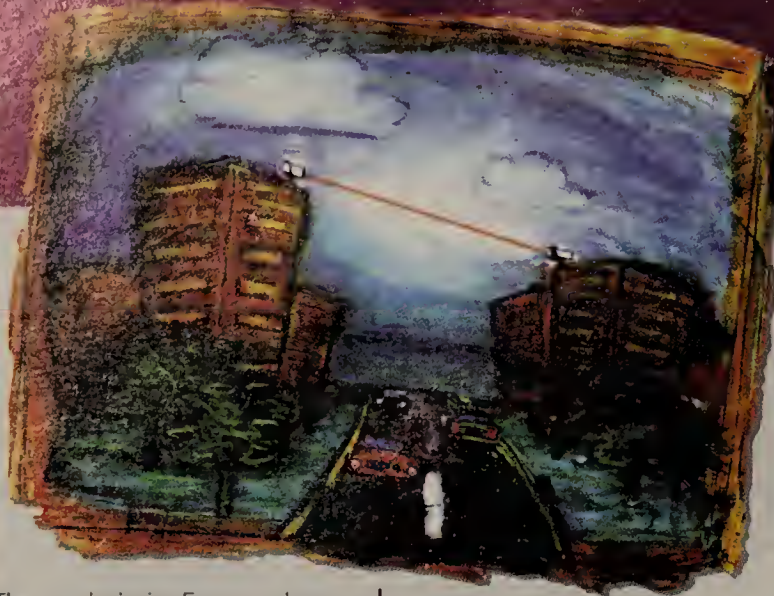
OF SHOW

1995

ATLANTA



Freespace, Freespace Turbo and Freespace Lite are trademarks of Silicom Manufacturing Technology Inc.



The award-winning Freespace laser link delivers wire-speed building-to-building connectivity at distances up to 1000ft. (300 meters). Cost-effective and easily installed, Freespace bridges the gap when traditional solutions like fiber are unavailable – and T-1 lines just aren't fast enough.

The Freespace family includes:

- Freespace Turbo for ATM, FDDI, and Fast Ethernet connections.
- Freespace Lite for an economical Ethernet link.

- A multiplexed Freespace solution integrating Ethernet with up to 4 T-1 voice lines.

Designed for all weather conditions, Freespace is your interbuilding solution for short-range, wire-speed connectivity.

Call us, fax us, or visit us at

<http://www.silcomtech.com>



**North America 1-800-388-3807**

Tel: (905) 238-8822 Fax: (905) 238-4976

Reader Service No. 269

Decrease your design time  
with an

## HTML <TAG> Generator



- Single Button Selection
- Overlay Identification
- No TSR's or Programming required by the user.
- Soft-Touch tactile keys
- PC O/S Independent
- User Programmable

It takes a minimum of four keystrokes or mouse movements to generate even the smallest <TAG>. With HTML Select you can now generate <TAGS> with a single push of a button. An overlay identifies each <TAG>, so all you have to do is position your cursor and press the <TAG> you want to use. Just plug in your keyboard. Soft-Touch tactile keys with predefined <TAGS> will reduce your mouse movements, keystrokes, and help to eliminate wrist strain. HTML Select works independently of your PC's operating system without TSR's and comes complete with one of four levels of predefined <TAGS>. Two additional "Arrow Keys" position your cursor to line variables for editing.

caption	/caption	title	/title	pre	/pre	img	img	tr	/tr	href	body	font	base	font	H3	/H3	&nbsp;	em	br
head	/head	body	/body	align	align	img	img	td	/td	href	body	font	/base	/font	H4	/H4	doct	/em	<
add	/add	html	/html	align	align	img	img	th	/th	href	H1	/H1	H2	/H2	H5	/H5	p	/p	>
				center	justi	src	hsrc			http									

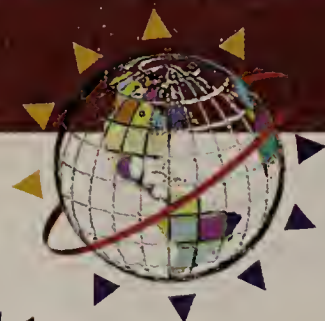
And, with KVEdit, users can program HTML Select for special operator benefits. Group your most used <TAGS> in easy-to-access positions of the touchpad, or create macro's to execute frequently used keyboard keystrokes with up to 25K of non-volatile RAM.

800.808.4672



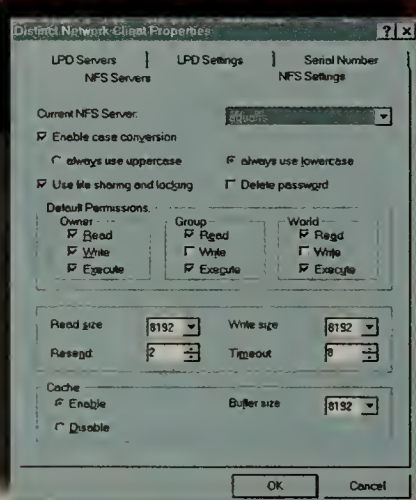
Reader Service No. 279

# Distinct NFS™ for Windows 95



## Highlights:

- Integrates seamlessly into Windows 95
- Mounts NFS drives from Explorer or Network Neighborhood
- Supports file and record locking
- Allows central authentication with a single server running PCNFSD for all NFS connectivity
- Prints to NFS or LPD print servers
- Allows login to all systems with a single login name and password or different login names for each system
- Allows single-operation logout of all systems accessed through Network Neighborhood
- Includes fine tune performance parameters for each server you access



**Free  
Evaluation Copy  
Available at...**



**distinct**  
The world leader in internet development tools.

**408.366.8933**

WWW: <http://www.distinct.com>

Fax: 408.366.0153

E-mail: [networkw@distinct.com](mailto:networkw@distinct.com)

Fastfacts: 408.366.2101

Reader Service No. 314

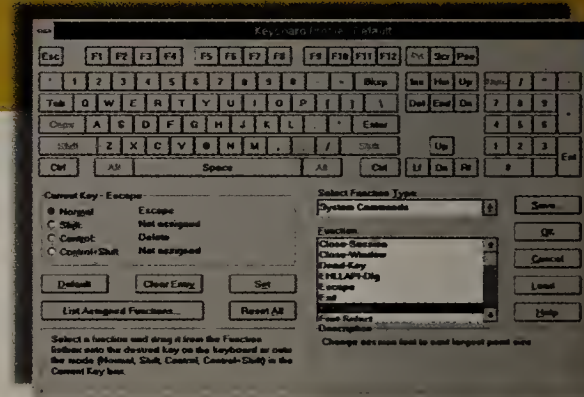
# Distinct IntelliTerm™

Integrated Terminal Emulator for DEC and IBM® Systems



## Highlights:

- TN3270 Emulation—Models 2,3,4 and 5 (for IBM Mainframes)
- 31796 Vector Graphics & 3279S3G
- TN5250 (24x80, 27x132) (for AS/400)
- VT52, VT100, VT220, VT320 & VT420 emulation (for DEC and UNIX Systems)
- Customizable keyboard layouts, poppads and session profiles
- VBA™ Advanced Scripting Language
- DDE, HLLAPI, EHLLAPI, WinHLLAPI and Visual Basic™
- Available for Windows 3.11, Windows 95 and Windows NT



**Free  
Evaluation Copy  
Available at...**



**distinct**  
The world leader in internet development tools.

**408.366.8933**

WWW: <http://www.distinct.com>

Fax: 408.366.0153

E-mail: [networkw@distinct.com](mailto:networkw@distinct.com)

Fastfacts: 408.366.2101

Reader Service No. 273











# *Relax. Your network is safe with Triticom.*



Don't you wish you could relax at your job, knowing your network is running smooth? With Triticom's line of award-winning LAN management tools installed on your network, you can. We design our products to help simplify your job, not complicate it. Our tools are software-based, meaning they run on the standard PC hardware you already have. Because of this, our products offer incredible power and performance at very affordable prices. Start relaxing and call Triticom today.

**LAN Traffic Monitors from \$395.00**

**Protocol Analyzers from \$945.00**

**LAN/WAN Bridges/Routers from \$245.00**

**SNMP Managers/Monitors from \$495.00**

**RMON Probes from \$595.00**

**60-day Money Back Guarantee**

**CALL FOR FREE DEMONSTRATION SOFTWARE**



Software Tools for LAN Management

Voice: 612-937-0772

Fax: 612-937-1998

BBS: 612-829-0135

Internet: <http://www.triticom.com>

[info@triticom.com](mailto:info@triticom.com)

CompuServe: GO TRITICOM





**ISDN<sup>ET</sup>**

## Thinking about ISDN?

Thinking about Remote Access?

## Think ISDN<sup>Net</sup>

### Integrated 10BASE-T Hub/Router

- 8-Port Ethernet Hub
- Multi-Protocol ISDN Router
- Fully SNMP Manageable

### Outstanding Performance

- RISC Processor
- Real-Time Operating System

### Proven Track Record

- 2 Years of Successful Installations
- Certified by Lucent Technologies
- Validated Interoperability

### Usage Management

- Scheduled Times
- Total Line Utilization

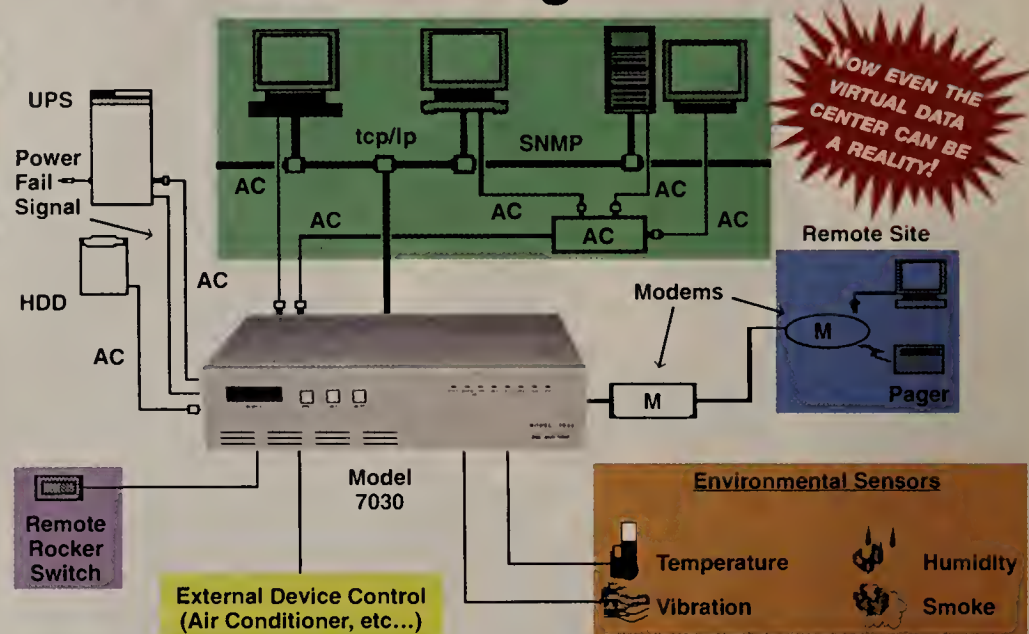
ISDN<sup>Net</sup> introduces the NetRouter™, a proven cost-effective, reliable solution for branch offices, remote sites and small businesses that need LAN-to-WAN connectivity. The NetRouter combines intelligent hub and multiprotocol routing for IP, IPX and transparent bridging for other protocols across ISDN into a single fully-manageable solution.

To learn more about NetRouter products and our '30-day Evaluation', call **408.522.5090**.

To find out how to become a reseller of ISDN<sup>Net</sup>'s products, call Dave Dembitz at **408.522.5092**.

Reader Service No. 226

## Save Money with Texas ISA's Ultimate UNIX Power Management Solution



### Don't Buy Multiple UPS's For Your Computer Room Servers.

Add Advance Power Management Features (like graceful server shutdowns) To Your Existing UPS!

#### Benefits:

- Protects your existing UPS investment.
- Protects the OS and data from being corrupted.
- Increases the life of your computers and peripherals.
- Eases local and remote systems management.
- Eliminates unnecessary travel time to reboot hung systems.
- Simplifies large scale server shutdowns and startups.

<http://www.texasisa.com>

**800-361-2256 / 713-493-9925**  
email: [isasales@texasisa.com](mailto:isasales@texasisa.com)

**Texas ISA**

HP-IB & SCSI Storage, and Power Management Solutions

Reader Service No. 230

## A remote access router, FRAD, data compressor and a DDS CSU/DSU you can upgrade to T-1...

**All in one box. You won't find a package that's easier to install !**

None of the hassles of connecting and maintaining all those separate devices. And, with the powerful Eastern Research SpanNet router, it's an easy upgrade when you're ready to go from DDS to T-1 and/or add a second WAN port.

The SNMP-managed SpanNet router supports IP/IPX routing and concurrent spanning tree bridging. It uses the industry-standard Stac algorithm for data compression and includes frame relay support, a dial back-up port, V.54 diagnostics, a built-

in BERT and flash memory. All for only \$1495 with a V.35 interface, \$1795 with a DDS CSU/DSU or \$1995 with a T-1 CSU.

For more information on SpanNet Routers and other unique Eastern Research products, call 800-337-4374 or write Eastern Research, 225 Executive Drive, Moorestown, NJ, 08057.

**Eastern Research**  
Products as Solutions

Reader Service No. 225

## TRAINING VIDEOS

Learn from the Experts



CINDY STEVENS  
GroupWise Expert



TIM GENDREAU  
CNI/Networking Expert



REED JACOBSON  
Visual Basic Author/Expert



JASON HELMICK  
CNI & MCT

### NEW MCP Video/CD Training

#### NT Workstation/Server

- Workstation—6 Videos(Exam 70-42) \$379.95
- Workstation—6 CDs \$469.95
- Server—6 Videos(Exam 70-43) \$319.95
- Special—All 11 Videos \$659.95
- Special—All 11 Videos/NT Kit \$859.95

#### Windows NT MCSE Training

This complete Windows NT Certification series will help you prepare for the MCSE Exam.

COMING SOON! ▶ NT 4.0

CALL FOR DETAILS ▶

#### Windows 95 Certification

#### Windows 95 Administration

- Installation & Troubleshooting \$89.95
- Architecture & Network Admin \$89.95
- Special—2 Videos \$179.95



#### TCP/IP Certification(Exam 70-53)

- TCP/IP—All 4 Videos \$329.95

#### TCP/IP MCP Training

This complete TCP/IP Certification series will help you prepare for the MCP Exam.

### Netware® Certification

#### NetWare CNE 3.x

3.x Complete CNE 3.x Training 16 Tapes \$995.95

#### NetWare 4.1 Target Training

- 4.1 Install & Config (course 804) 2 Tape \$159.95
- 4.1 Administration (course 520) 5 Tapes \$399.95
- 4.1 Bundle (course 520, 804) 7 Tapes \$559.95

#### GroupWise Administration

NetWare 4.1 Admin (course 520) 5 Tapes \$399.95

#### GroupWise Administration Series

(course 520, 325, 327, 328) \$595.95

#### Novell NetWare Training

These NetWare Certification Series' will help you prepare for the required Novell CNA and CNE Exams.

### Lotus Notes® Training

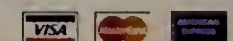
#### Lotus Notes Series

- Notes User 1/2/3 \$129.95
- Lotus Notes Administration Level 1 \$329.95
- Notes Administrator 1/2/3/4 \$329.95
- Lotus Notes App/Dev \$329.95
- App/Dev 1/2/3/4 \$329.95

FAST FAX Course Outlines 1.800.482.8244

LearnKey on the Net: <http://www.learnkey.com>

CALL NOW TO ORDER



SOURCE CODE #48



**1-800-865-0165**



All company names and/or products are trademarks and/or registered trademarks of their respective holders.

Reader Service No. 275



**Sizzling  
Deals**

**Red Hot  
Pricing**

# Affordable Fast Ethernet Solutions

## Intel

The Express Switching Hub increases the bandwidth of Fast Ethernet installations by dividing the network into segments. It's a Fast Ethernet store-and-forward switch with five 100Base-TX ports and two optional high-speed 100Base-TX/FX expansion ports. (ES100TX) .....\$3,100



The Intel Express twelve-port 100Base-T Stackable Hub for bandwidth hungry networks. (EC100TX) .....\$1,450



Intel EtherExpress Pro/100 Adapters for the fastest total performance solution for networking your client and server with the industry's lowest CPU utilization. (PILA8465B)Single/5PK/20PK.....\$110/530/1,850

The Intel two-port 10/100 Downlink provides connectivity between Fast Ethernet and existing 10Mbps LANs. (EC100DL).....\$725



**Express Switching Hub Bundle:** Express WorkGroup Switching Hub Bundle gives servers dedicated 100Mbps bandwidth, moving clients to 100Mbps with Intel Hubs and Adapters, and a downlink module to connect to existing 10Mbps LANs. Intel WorkGroup Solution includes one Switching Hub (ES100TX), three twelve port Stackable Hubs (EC100TX), thirty 10/100 32-Bit PCI Adapters (PILA8465B), and a two-port 10/100 Downlink Module (EC100DL) .....\$10,195

## Bay Networks



The LattisSwitch is a sixteen-port dual speed 10/100 Ethernet Switching Hub. (28115).....\$6,435

The BayStack 100Base-TX Stackable Hub provides a low-cost, high-performance solution. Up to six hubs can be linked to act as a single unit supporting a total of 144 unmanaged or 132 managed ports. (AT2202001).....\$1,260



## D-Link

FlexSwitch five-port 10/100 switch with one expansion slot for ISDN BRI or 100Base-TX/FX modules, a high bandwidth switching solution for workgroups (DES-3205) *limited time offer* includes five D-Link 10/100 PCI adapter cards (DFE500TX).....\$2,100



The ProFast Hub is a Fast Ethernet hub with eight 100Base-TX network ports and one selectable uplink port. (DFE808TX).....\$565

## 3Com

The SuperStack II Switch 1000 provides twelve or twenty-four Ethernet ports and one 100BaseT port for improved desktop to server traffic congestion at a low cost per port.

(3C16901A).....\$2,505  
(3C16900A).....\$3,135



SuperStack II Hub 100 twelve-port hub for economical high speed connectivity(3C250A-TX/1).....\$1,725  
Delivering the highest performance at 10Mbps or 100Mbps, the Fast EtherLink XL PCI interface card revolutionizes network connectivity. (3C905-TX) Single/5PK/20PK.....\$135/630/2,395

## NBase



The MegaSwitch II is a Fast Ethernet switch featuring eight 10/100 ports and two dual high-speed network interface slots. These expansion slots provide capability for extra twisted-pair ports, fiber optic interfaces or an ATM or GigaBit Ethernet uplink. (NH 2012).....\$6,495

The MegaStack 100 is a high speed 100Base-TX/FX stackable hub which brings Fast Ethernet performance to mission-critical and bandwidth-intensive applications. The hub consists of twelve RJ45 ports connected over two-pair CAT 5 UTP cabling and an optional fiber optic port. (NH1012) .....\$1,425



## Specials

### SMC

10/100 32-Bit PCI Adapter (SMC9332DST).....\$69/320/1,200  
EtherEZ Plug N Play ISA Adapter RJ45 (SMC8416T).....\$44  
EtherEZ Plug N Play ISA Adapter RJ45 + BNC (SMC8416BT).....\$55  
EtherPower PCI Combo Adapter RJ45 + BNC (SMC8432BT).....\$72

### West Hills

Ethernet ISA BNC Adapter (ENET16T).....\$30  
Ethernet ISA BNC/RJ45 Adapter (ENET16CT).....\$32  
8-Port Ethernet Hub BNC & AUI Ports (HT08TP).....\$89  
16-Port Ethernet Hub BNC & AUI Ports (HT16TP).....\$178  
32-Port Ethernet Hub BNC & AUI Ports (HT32TP).....\$356

Visit Our On-Line Catalog at <http://www.west-hills.com>

Visa/MasterCard/Discover/American Express • Fast Delivery • Most Orders Ship The Same Day • Prices Subject To Change Without Notice

**NBASE**

**ASANTÉ**

**Bay Networks**

**WEST HILLS  
LAN SYSTEMS**  
7949 Woodley Avenue, Van Nuys, CA 91406  
**1-800-FOR-LANS**  
1-800-367-5267  
Technical Support: 818-773-8171 • Fax: 1-818-773-8932

**3Com**

**intel**

**ciscopro**

Reader Service No. 253





OUR  
ENCRYPTION  
SYSTEM.

THOSE WHO  
PEDAL ANTIQUE  
TECHNOLOGY.



## SECURITY AND TECHNOLOGY, WITH AN ATTITUDE.

Security is paramount. When it's your job to guarantee the safe transit of data across Wide Area Networks, the SUMMIT ENCRYPTION SERIES of products is secure technology at its best.

The SUMMIT ENCRYPTION SERIES is security for the present and the future. While you're cruising with the latest technology, let someone else pedal the weak link.

Call Toll Free 1-800-387-8706  
for more information.

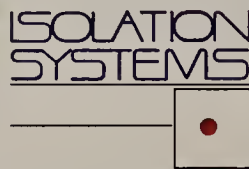


### THE SUMMIT FEATURES:

- Multiple Protocols
- Secure Data Transmission
- DES, Triple-pass DES, NATD-specific and other proprietary algorithms
- Support for secure virtual networks
- Router Independent

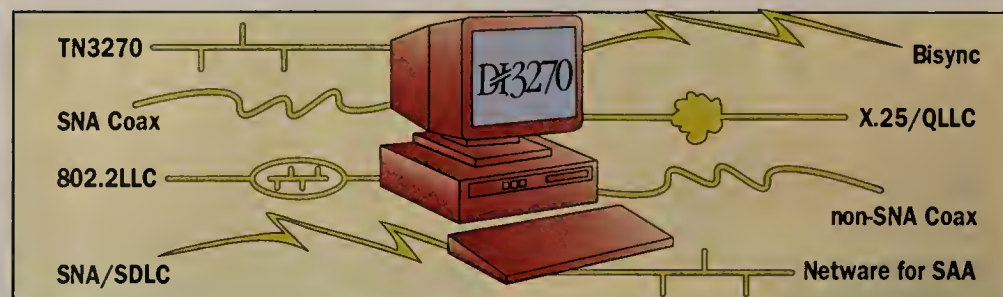


26 Six Point Road,  
Etobicoke, Ontario,  
Canada M8Z 2W9  
Tel. (416) 231-1248  
Fax. (416) 231-8561  
www.isolation.com



Reader Service No. 262

## The Only 3270 Solution You'll Ever Need



DATA INTERFACE  
SYSTEMS CORPORATION

512-346-5641 • FAX 512-346-4035 • 800-351-4244 • www.di3270.com/di

Reader Service No. 238

## Total CD-ROM Networking SOLUTIONS

- Plug & Play CD-ROM Networking
- Compatible with ALL Major Operating Systems
- Latest and Fastest CD-ROM Drives
- Customizable Drive Arrays
- Remote Access Systems
- Intranet Servers
- CD Writers/Duplicators/Media
- Direct Partners with Major Manufacturers
- GSA Schedule: GS-35F-3303D
- Toll-Free Technical Support



**TODD ENTERPRISES INC**  
(800) 445-TODD • (800) 445-8633  
In NY: (516) 487-3976

FAX (516) 466-6774 • http://www.toddent.com

**INSTANT Shared CD-ROM Access**  
New OPTI-NET Direct plugs into your Ethernet network, providing seamless DOS/WIN, NFS, and Web connectivity. No TSRs and no NLMs!

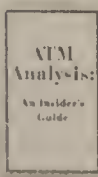
Reader Service No. 266



## See ATM. Warts and all.

To realize the full potential of ATM, you don't have to look far into the future. But you do have to look deep into the network and thoroughly analyze each and every cell.

CellBlaster is the first analyzer designed from the ground up to capture and filter each cell in real time, full bandwidth at 155 Mbps. It's the most cost effective analyzer on the market. And it has an easy-to-use Windows interface that will have you up, monitoring, capturing, filtering and decoding traffic like an expert within minutes.



Now, who would make critical ATM design and deployment decisions without all the information? Certainly not you. Start by reading our free white paper, *ATM ANALYSIS: An Insider's Guide*. Call us at 1-800-741-8724, or e-mail us at info@net2net.com, today. Net2Net's CellBlaster. The ATM Insider.™



net2net  
CORPORATION

http://www.net2net.com

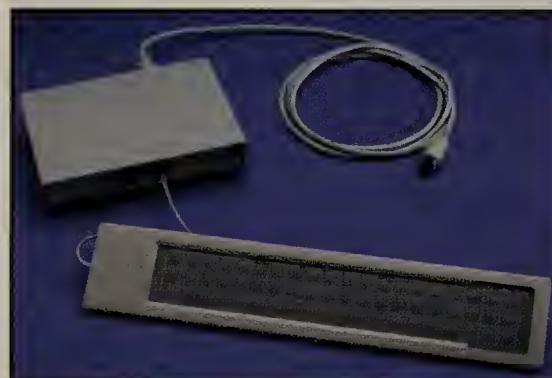
tel +1.508.568.0600 • fax +1.508.568.8858  
Net2Net Corporation, 131 Coolidge St., Hudson, MA 01749

See us at  
NetWorld+Interop,  
Booth #6370

Reader Service No. 286

## Still using Keyboard Commands or Menus?

Select your Keyboard/Video Switch ports with KVSelect



- Single Button Selection
- Overlay Identification
- No TSR's Required
- Soft-Touch tactile keys
- PC O/S Independent
- User Programmable

Designed primarily for Keyboard/Video Switch(KVS) users, KVSelect can be used by anyone who will benefit from grouping repetitive keystrokes under a single key. The KVSelect 60, has 60 tactile keys that are preprogrammed to switch ports on most KVS switches. Custom overlays are installable allowing you to identify servers by name. Especially useful for those KVS applications that have remote operators, expansion units, or users who want to provide organized labeling and selection of the KVS ports.

Base	Base	Base	Base	X1	X1	X1	X2	X2	X2	X2	X3	X3	X3	X3	SCAN	SCAN	SCAN	SCAN
A	B	C	D	A	B	C	A	B	C	D	A	B	C	D	10	20	30	ON
Base	Base	Base	Base	X1	X1	X1	X2	X2	X2	X2	X3	X3	X3	X3	SCAN	SCAN	SCAN	SCAN
E	F	G	H	E	F	G	E	F	G	H	E	F	G	H	40	50	60	OFF
Base	Base	Base	Base	X1	X1	X1	X2	X2	X2	X2	X3	X3	X3	X3		TRON		ENTER
I	J	K	L	I	J	K	I	J	K	L	I	J	K	L				

And, with KVEdit, users can program KVSelect for special operator benefits. Group Novell, OS/2 and NT servers in color coded areas of the touchpad, or create macro's to execute frequently used keyboard keystrokes with up to 25K of volatile RAM.

800.808.4672

TRON  
INTERNATIONAL, INC.

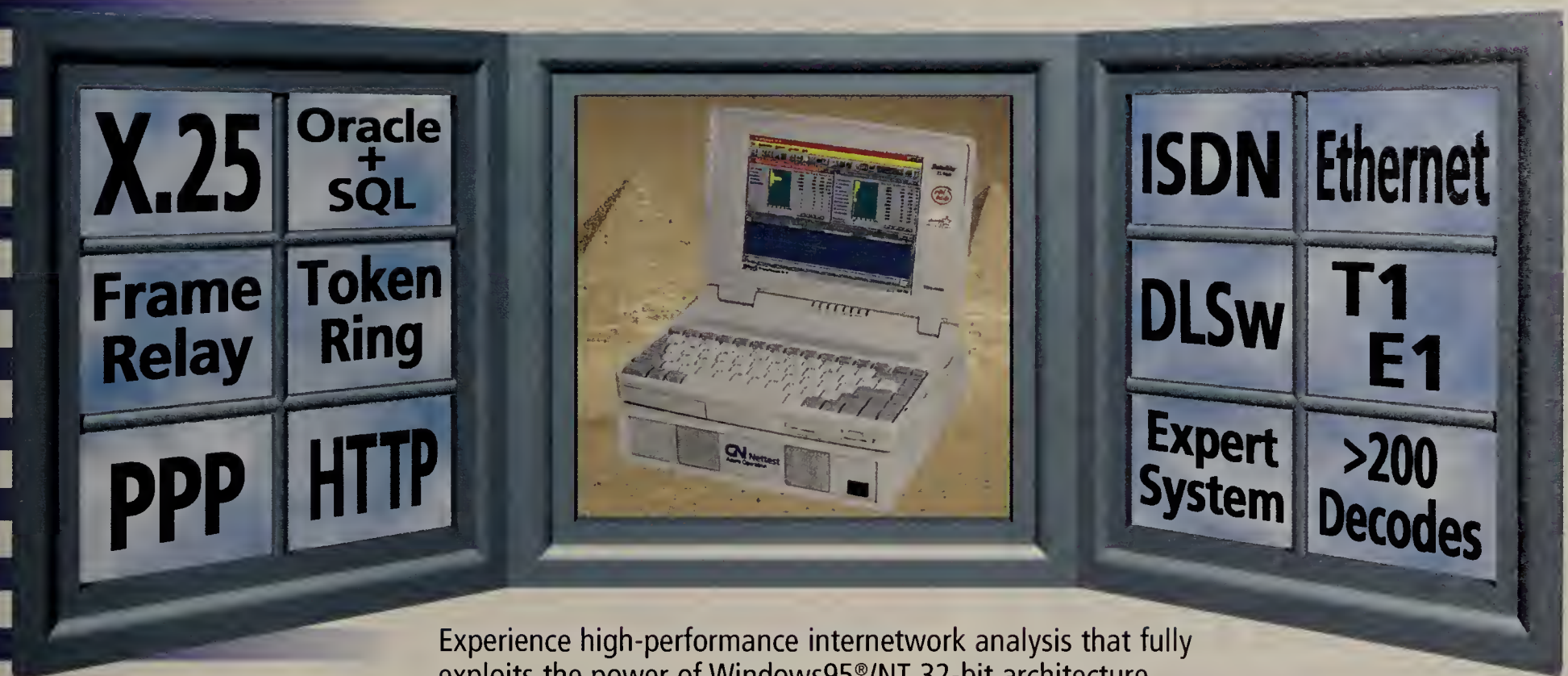
Reader Service No. 278



# WinPharaoh ix

internet xpert

## The First Internetwork Analyzer for Windows95®/NT



Experience high-performance internetwork analysis that fully exploits the power of Windows95®/NT 32-bit architecture and the fast throughput of RISC-based LAN/WAN adapters.

View real-time displays of Expert Event Analysis, Protocol Decoding, and Performance Statistics for multiple network segments *simultaneously*.

Call or write us for a free, no-obligation trial. And prove for yourself that when it comes to network analyzers, there is only one choice: WinPharaoh ix from GN Nettest.

### Features

32-bit Windows95  
Synchronized LAN/WAN  
>200 Decodes  
WAN over PCMCIA  
3-Tier Expert  
Oracle Decodes

GN Nettest	HP	NGC	W&G
Yes	No	No	No
Yes	No	No	No
Yes	No	Yes	No
Yes	No	No	No
Yes	No	No	No
Yes	No	Yes	No

**GN Nettest**  
Azure Operation

Call (800) 233-3800

Fax to (508) 435-0448

Visit our WEB site at

<http://www.azure-tech.com>

or send in the coupon.

WinPharaoh is a trademark of GN Nettest. All other trademarks are the properties of their respective companies.



See us at Interop Atlanta Booth 3230

Yes! I want a FREE trial evaluation of WinPharaoh.

Name \_\_\_\_\_

Company \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Internet \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

GN Nettest, Azure Operation, 63 South St., Hopkinton, MA 01748  
Phone: (508) 435-3800, Fax: (508) 435-0448



**D**

**Circle Reader Service No. 290**

**Circle Reader Service No. 220**

**Circle Reader Service No. 263**

**Circle Reader Service No. 308**

**Call to place your ad in the Marketplace**  
**1-800-622-1108 ext. 465**

**Circle Reader Service No. 280**

**Circle Reader Service No. 270**

**Circle Reader Service No. 254**

Consulting & training for computer network optimization

**Circle Reader Service No. 234**

**PCT** (800)773-7281 CASTELLE  
 Fax: (714)458-3884  
 EMAIL: [tomo@primenet.com](mailto:tomo@primenet.com)  
 All Trademarks and Trade Names are the  
 Property of their Respective Holders!



New

# Configuring Cisco Routers

The only available Cisco computer-based training course

Course includes: Introduction to Cisco's Internetwork Operating System (IOS™), its functions, and commands

Using this course you will learn "How To"

- ✓ Configure Cisco Routers for IP, IPX and bridging
- ✓ Configure Cisco Routers for security using Access Lists
- ✓ Use trouble-shooting techniques: pinging, trace routing and the use of TELNET access commands

Plus -- A Free LAN/WAN Technology Self Study Review Course.



General DataComm Service

Call Today . . . Be Ready For Tomorrow 1.800.475.3130

MasterCard/ Visa/ Amex accepted

We're all you need to know

Cisco is a Trademark of Cisco Systems, Inc.

Circle Reader Service No. 310

Products purchased as a result of Marketplace ads.

- ✓ Hubs
- ✓ Routers
- ✓ Software training
- ✓ Memory products
- ✓ Ethernet Cards
- ✓ Netware products
- ✓ Modems
- ✓ Testing equipment
- ✓ Multiplexers
- ✓ File Servers
- ✓ etc.
- ✓ etc.
- ✓ etc.

For details on how to put your ad here



Carla Cappucci  
1-800-622-1108

LAN/WAN • BUY/SELL  
MODEMS FULLY WARRANTED  
DSU/CSU's NEW/REFURBISHED  
MULTIPLEXERS RENTAL  
T-1 EQUIPMENT LEASE  
HUB, BRIDGES, ROUTERS, ETC.

Fibermux Cabletron Synoptics

CISCO SPECIALISTS

AT&T Bay Networks

We carry all manufacturers, call John, ext. 101.

http://www.psyber.com/~adcs

PHONE 800-783-8979  
FAX (916) 781-6962  
A D C S INC.

Circle Reader Service No. 240



## Fast Ethernet

intel. PRO/100B PCI \$99  
Express 12-Port Hub \$1425  
Fast Etherlink XL PCS \$121  
SuperStack II 12-Port Hub \$1749

COMPAQ 8/24-Port Hub \$949/\$2730  
10/100 Dual Speed Hub \$3685

ACCTON Accton/Intel Bundle \$1249  
(1) Accton 8-P Hub & (5) Intel PRO/100B's

RELA 8-Port 10BT Hub, BNC\* \$79  
16-Port 10BT Hub, BNC, AUI\* \$159

\*5 Year Manufacturer's Warranty

Fast Ethernet Switches Call

NBASE Bay Networks SMC

(801) 553-7249 Sales

We welcome COD's, Government and Academic PO's

Circle Reader Service No. 309

## Internetworking Test Tools

For conformance testing and performance measurement  
Ask for details about DTI's

LaneTest 100  
for testing ATM protocols

Call us for assistance in Developing ATM software

- LAN Emulation
- UNI, PNNI
- IP and ARP over ATM
- DXI, IIS, ILMI

Digital Technology  
1-800-DTI-INFO

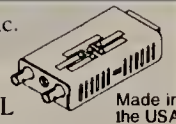
Your partner in networking

Tel: 617-229-9797 Fax: 617-229-7979  
email: info@dtix.com

Circle Reader Service No. 229

## Factory Direct Savings

Fiberdyne Labs, Inc.  
Model FTX-A11  
State of the Art  
AUI to 10BASE FL  
Fiber Optic Transceiver



### FTX-A11 Pricing

Qty	Unit Price
1-5	\$146.00
6-20	\$139.00
21+ Call (800) 894-9694	

Fiberdyne Labs, Inc.  
818 ParkLane Dr., Herkimer, NY 13350  
Circle Reader Service No. 291

## INFORMATION DATA PRODUCTS CORP.

Modems  
Multiplexers  
DSU/CSU's  
T-1/FT-1  
Voice/Data  
Bridges/Routers

New - Refurbished  
"Data Communications Specialists"

1-800-362-3770

wan-info@planet.net

http://www.planet.net/idpc

Circle Reader Service No. 217

# INTERNET SERVICE PROVIDERS & WEB HOSTS

## IBM Internet Connection

(800) 455-5056 National  
globalnetwork@info.ibm.com  
SLIP, Leased Lines

## IMV Internet

(800) 241-7066 National  
http://www.imvi.com  
ONE FREE MONTH Web Hosting via DS3 connection with dual T1 backup.  
Shared server and co-location services; security; shell; Dev-Com; Easy Site.

## InterNex Information Svcs.

(800) 595-3333 National  
(408) 327-2388 California  
info@internex.net  
Web Hosting, CO-Location, Intl. Mirroring, Netcasting, ISDN, Frame Relay, T1, SMDS, T3, ESD

## New York Net

(718) 776-6811 NY/NJ/CT/PA/MA  
sales@new-york.net  
SLIP, PPP, Leased Lines, T1s, Frame Relay, 10Mbps

## Net Resource, Inc.

(603) 421-0570 National  
http://www.net-resource.com  
sales@net-resource.com  
Nationwide frame relay connections, Web Server CO-Location, Commerce enabled Web Hosting

## TIOcom

+ (714) 348-2957 Worldwide  
http://www.tio.com  
sales@tio.com  
WEB Hosting & Outsourcing

## UUNET Tech. (AlterNet)

(800) 258-9690 National  
info@uunet.net  
Web Svrs, Frame Relay, ISDN, PPP, Leased Lines, Security, SLIP, UUCP

For information on listing your service here, contact Carla Cappucci at 800-622-1108 x465, ccapp@nww.com

For More Information About Marketplace  
1-800-622-1108

# Full T3 PCI OEM WAN Modules

## CC3i

- Full T3/E3
- HSSI to 52 MBps
- DSX Interface
- i960 Processor
- 32bit PCI Interface



Protocols  
Frame Relay  
HDLC  
PPP  
ATM

OS Support  
Windows/NT  
Unix  
Unix Streams  
DOS

\*\*Visit Us at:  
Booth #3658  
Network+Interop  
Atlanta

SDL  
Communications, Inc.

Phone 508-238-4490  
Fax 508-238-1053  
Email: sales@sdldcomm.com  
Web Site: www.sdldcomm.com

Circle Reader Service No. 294

## VANDY MICRO ALWAYS NETWORKING!

100 Base-TX Fast ENET Hubs	100 Base-TX Fast ENET Cards	Promo Novell Specials	Promo Novell Specials
ANSER 100BTX 8 port Hub . . . \$695	ANSER 100/100BT PCI . . . \$95	4.1 - 5 User . . . \$395	3.12 - 5 User . . . \$485
COMPEX 100BTX 8 port Hub . . . \$895	COMPEX 10/100BT PCI . . . \$125	4.1 - 10 User . . . \$795	3.12 - 10 User . . . \$995
3COM 100BTX 12 port stack . . . \$1,850	3COM 3C595 1/5/20 . . . \$149/660/2740	4.1 - 25 User . . . \$1,095	3.12 - 25 User . . . \$1,395
NETWORTH 100BTX 8 port hub . . . \$995	INTEL P148465B-1/5 . . . \$130/575	4.1 - 50 User . . . \$1,595	3.12 - 50 User . . . \$1,895
10BT/100BTX 24 port . . . \$3,490	PLA8485 . . . \$700	4.1 - 100 User . . . \$1,895	3.12 - 100 User . . . \$2,495
BAY NETWORK 100BTX 12 port Hub . . . \$1,580	SMC 933DST . . . \$190	4.1 - 250 User . . . \$3,250	3.12 - 250 User . . . \$3,995
10/100 ENET Switch	Remote Access	Managewise V2.0	Network for SAA V2.0
COMPEX 24 Port 10/100 Mbps UTP \$1,899	ASCEND P25-1U-PX ISDN/IP Router . \$625	5 User . . . \$495	SAA - 16 Session . . . \$995
BAY NETWORK 10/100 Mbps UTP Sw . . . \$9,000	P25-1U-RTR-CO-FX Router . \$975	10 User . . . \$795	SAA - 64 Session . . . \$2,495
NETWORTH Fast Pipes 6 port hub . . . \$3,495	Cisco CPAT004A IP Router . . . \$1,520	25 User . . . \$1,195	SAA - 128 Session . . . \$3,495
Cisco CPW 1601A . . . \$3,900	CPA2501A IP Router . . . \$1,700	50 User . . . \$1,695	SAA - 254 Session . . . \$4,995
	3COM 3C8422 IP/IPX Router . . . \$3,900	100 User . . . \$2,385	Visa/M.C./AMEX Corporate or School P.O.'s Welcome
		250 User . . . \$3,250	

NOVELL NW UPGRADES UP TO 65% OFF!  
Vandy Micro Corp.  
(800)373-2485

Fax: (714) 768-1063 EMAIL: vandy5@ix.netcom.com  
Prices and Specifications Subject to Change!

Circle Reader Service No. 221



NEW REFURBISHED BUY SELL NEW REFURBISHED BUY SELL

## MSI Communications

Nationwide Services • 24-Hour Technical Support  
CNE Services • Trade-In Credit

### WAN Products

Adtran  
AT&T Paradyne  
BAT  
Digital Link  
INC  
Micom  
NET  
Newbridge  
Verilink

### Distribution Products

Codex  
GDC  
IBM  
Micom  
Motorola  
Racal Milgo

Spectron  
Symplex  
Tellabs  
Timeplex  
UDS  
Vitalink

### LAN Products

Bay Networks  
Cisco  
Compression Labs  
Cubix  
Develcon  
Livingston  
Madge  
Novell  
Nyxplex

### Specialized Products

#### Refurbished

## CISCO SYSTEMS

AGS+, 2500's, 4000's, 7000's

Data, Voice & Video Networking  
7 Waterloo Road, Stanhope, NJ 07874  
TEL 201-347-3349 • FAX 201-347-7176  
<http://www.msic.com>

An ESOP Company.....Where the Employees are Owners

Circle Reader Service No. 232

## Computer Furniture

- > Network Organizers
- > Adjustable Ergonomic Tables
- > Classroom / Labs

[www.computercomforts.com](http://www.computercomforts.com)

OR CALL COMPUTER COMFORTS AT  
(713)488-2288

Circle Reader Service No. 282

## NETWORK HARDWARE

ROUTERS • HUBS • BRIDGES • MODEMS • MUXES  
DSU/CSU • FRAME RELAY • T1 • ISDN

BUY/SELL/LEASE

# CISCO

MOTOROLA • ASCEND • LIVINGSTON • 3COM  
BAY NETWORKS • CISCO • ADTRAN • US ROB

800-230-6638

Fax: 805-964-5649  
<http://www.networkhardware.com>

NETWORK HARDWARE RESALE, INC.  
1800 THE STRAND • HERMOSEA BEACH, CA 90254

Circle Reader Service No. 244

## Coming in October Product Reviews

Issue Date		Close
October 7	Comparative Product Review on CD-ROM server software for Windows NT.	Sept. 25
October 14	Comparative Product Review on Netware 4.11.	Oct. 2
October 21	Comparative Product Review on low-end routers.	Oct. 9
October 28	Server Review Series	Oct. 16

**Bonus Distribution at**  
Unix Expo, New York  
Network+Interop, Paris  
Networks Expo, Dallas

To reserve your ad space call Carla Cappucci.  
Direct Response Advertising  
1-800-622-1108 ext. 465

Please note that comparative and single product review dates and topics are subject to change without notice.

## LAN/WAN NEW/USED LAN/WAN NEW/USED HUGE 3Com INVENTORY!!!

CABLETRON SYNOPTICS PROTEON BICC NETWORK  
CISCO NOVELL CHIPCOM INTEL SMC DCA IBM  
WE BUY/SELL NEW/USED EXCESS LAN/WAN STUFF

NEW 3Com SPECIALS	NEW 3Com SPECIALS	CABLETRON (U)	3COM (U)
509B-TPO.....\$70* FMS 1 DEALS! 8 PORT.....\$145 12 PORT.....\$250 24 PORT.....\$700 10 PORT CX.....\$1125 ADD SNMP ABOVE \$300 EAGLE 8 PORT.....\$100 *MINIMUM QTY 3	FMS II HUB 12 PORT.....\$425 24 PORT.....\$775 ADD SNMP ABOVE \$425 8 PORT.....\$175  <b>SWITCHES</b> 3Com 12 PORT.....\$2400 3Com 24 PORT.....\$3100 3Com 12 PT/ATM.....\$3800 SMC 6 PORT.....\$995 CNET 4 PORT.....\$650 LOTS MORE - CALL!	TPMIM-24.....\$995 TPMIM-34.....\$1200 TPMIM.....\$350 TRMIM44A.....\$1800 TRMIM12.....\$600 TRMIM14.....\$1400 THINMIM.....\$500 MT800.....\$125 2119.....\$45 CPT100.....\$50 2210.....\$45 EMME6.....\$2200 FR3000.....\$700 IRM2.....\$600 ETSMIM.....\$1200 FDMIM4.....\$2600 FOMIM16.....\$900 FOMIM28.....\$1600 FOMIM22.....\$1300 M8PSM.....\$475 MMAC8FNB.....\$550 MMAC3FNB.....\$375 LOTS MORE!!!	FMS2 12.....\$375 FMS2 24.....\$650 FMS1 12.....\$325 FMS1 24.....\$550 ADD SNMP ABOVE \$300/200 509TP.....\$55 509COAX.....\$60 619 16/4 TKN.....\$125 <b>NETBUILDER 1-2</b> <b>LANPLEX/3GH</b> <b>MSH/CS/IB/ECS</b> <b>WAY TOO MUCH</b> <b>TO LIST-CALL!!!</b>  <b>CHIPCOM (U)</b> 6010C-A.....\$1800 6017C-B.....\$2100 6000PS.....\$475 5006-C.....\$800 5017C-2.....\$1100 5108M-TP.....\$600 5101M.....\$1200 5000MRCTL.....\$1200 MORE-PLEASE CALL!!
NIC DEALS	FAST ENET	TOKEN RING (U)	SYNOPTICS PROTEON NETWORK CISCO
509B-TPO 100PK.....\$550 509B-COMBO.....\$95* 590 PCI TP.....\$100* 590-COMBO.....\$125* 595 TX-10/100.....\$130* 589C-TP PCM.....\$140 8 BIT TP.....\$30* *MINIMUM QTY 3	3Com 12 PORT.....\$1850 SMC 16 PORT.....\$2200 NETWORK 8 PT.....\$1350	IBM8228.....\$95 IBM25F7367.....\$125 INTEL 8130.....\$130 PROT. 1390.....\$100 PROT. 1392.....\$135 MUCH MORE - CALL!	TOO MUCH TO LIST-PLEASE CALL!
ROUTERS	NETWARE 3.12/4.1	ERGONOMIC INC.	
NETBUILDER I-II REMOTE ACCESS REMOTE OFFICE CALL FOR PRICING!!!	5 10 25 50 100 \$555/1150/1525/1795/2695	47 Werman Court • Plainview, NY 11803 Purch: 516-293-5200 • FAX: 516-293-5325	
WE WARRANTY!	WE BUY YOUR USED LANS/WANS	QTY DISCOUNTS!	
VISA/MC/AMEX COD & Terms	FOR SALES ONLY CALL TOLL FREE 800-AKA-3Com (800-252-3266)	OUR 14TH YEAR! U=Used	

Circle Reader Service No. 271

## NOVELL NETWORK V4.1

\*5 USER.....\$ 499  
\*10 USER.....\$ 999  
\*25 USER.....\$1299  
\*50 USER.....\$1499  
\*100 USER.....\$1899  
250, 500, 1000 User and  
V3.12 call for price.

**WE WILL BEAT OR  
MATCH ANY  
ADVERTISED PRICE**

For more products visit us on-line  
<http://www.fcsnet.com>  
Prices are subject to change.

**FIRST COMPUTER**  
1-800-325-1911

Circle Reader Service No. 277

REFURBISHED

## SynOptics Bay Networks

Largest Inventory of Refurbished SynOptics in America!

- SynOptics Trained
- Proven Track Record
- SynOptics Authorized
- We Stock What We Sell!
- One Year Warranties
- We Buy Used Equipment

WE REPAIR ALL SYNOPTICS

# National LAN Exchange

# 800-243-LANS

1403 W. 820 N. Provo, UT 84601 Voice 801-377-0074 FAX 801-377-0078

Circle Reader Service No. 231

CABLETRON  
systems  
The Complete Networking Solution

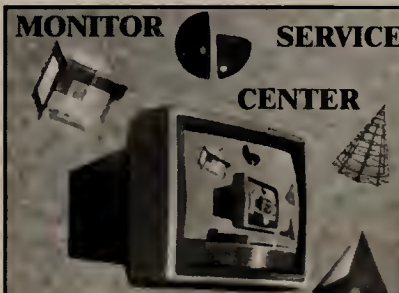
NOVELL

3Com

IBM

Wellfleet

proteon



**CD ELECTRONIC**  
1-800-434-9784

4424 San Fernando Rd., Glendale, CA 91204  
Phone: 818-241-3495 Fax: 818-241-3498

Circle Reader Service No. 312

## USED CISCO DIRECT

> Routers > Switches  
> Hubs > Modems  
> ISDN/ATM > NICS  
> T1 CSU/DSUs

> Synoptics > 3COM > IBM > Modge > Sun  
> Ascend > Cabletron > USRobotics > Shiva  
> Motorola > Bay Networks > Livingston  
> ADC Kentrox > Intel > Newbridge > Adtron

**m/Net**  
m/Net Communications Inc. 43-26 52nd Street Woodside NY 11377  
Voice 718-565-3033 Fax 718-899-1019 Web [www.mnet.com](http://www.mnet.com)

**DIGITAL WAREHOUSE**  
Your Information  
Superhighway  
Discount Source

1-800-553-4383

Circle Reader Service No. 259



## NETWORK WORLD, INC.

THE MEADOWS  
161 WORCESTER ROAD, FRAMINGHAM, MA 01701-9172  
(508) 875-6400/FAX: (508) 879-3167

Colin Ungaro, President/CEO  
Evilee Thibault, Senior Vice President/Publisher  
Mary Kaye Newton, Assistant to the President  
Eleni Brisbols, Sales Associate

### ADMINISTRATION

Mary Fanning, Vice President Finance and Operations  
Frank Coelho, Office Services Manager  
Paul Mercer, Billing Manager  
Mary Rinaldo, Telecommunications Administrator  
Tom Garvey, Mailroom Supervisor  
Tim DeMeo, Mailroom Assistant

### HUMAN RESOURCES

Mary Cometta Brown, Human Resources Director  
Danielle Volpe, Human Resources Assistant

### MARKETING

Virginia Lehr, Director of Marketing  
Kristin Wattu, Marketing/Promotions Manager  
Barbara Sullivan, Market Research Analyst  
Heidi Creighton, Public Relations Manager  
Donna Kirkey, Marketing Design Manager  
Nancy Vickers, Graphic Designer

### GLOBAL PRODUCT SUPPORT CENTER

Joanne Wittren, Senior Global Marketing Services Manager  
Jane Davey, Associate Global Marketing Services Manager

### ADVERTISING OPERATIONS

Karen Wallace, Manager of Advertising Operations  
Cathy Sampson, Sr. Advertising Account Coordinator  
Ann Jordan, Advertising Account Coordinator  
Mario Matoska, Direct Response Ad Coordinator

### PRODUCTION

Ann Finn, Production Director  
Greg Morgan, Production Supervisor

### RESEARCH

Ann MacKay, Research Director

### CIRCULATION

Deborah Winders, Vice President Circulation  
Richard Priante, Director of Circulation  
Bobbie Cruse, Assistant Circulation Director  
Mary McIntire, Circulation Assistant

### IDG LIST RENTAL SERVICES

Christine Cahill, Sales Representative  
P.O. Box 9151, Framingham, MA 01701-9151  
(BDD) 343-6474/(508) 370-D825, FAX: (508) 370-D020

### PROFESSIONAL DEVELOPMENT GROUP

William Reinstein, Senior Vice President/Business Development  
Debra Becker, Marketing Manager  
Ann Roskey, Product Manager/Online Services  
Ed Garabedian, Systems Specialist/Online Services  
Christie Sears, Finance/Operations Manager  
William Bernardi, Senior Product Specialist  
Peter Halliday, Product Manager/NetDraw  
Andrea D'Amato, Sales Manager/Strategic Partnerships  
Sharon Schawbel, Product Specialist  
Betty Amaro, Operations Specialist  
FAX: (508) 820-1283

### NETWORK INFORMATION/ DIGITAL IMAGING SERVICES

Jack McDonough, Network Director  
Eric Powers, Network IS Support Specialist  
Anne Nickinello, Digital Imaging Manager  
Deborah McKenna, Imaging Specialist  
FAX: (508) 875-3090

### DISTRIBUTION

Bob Wescott, Distribution Manager  
(508) 879-0700

## IDG

Patrick J. McGovern, Chairman of the Board Kelly Conlin, President Jim Casella, Chief Operating Officer William P. Murphy, Vice President Finance  
Network World is a publication of IDG, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. IDG publishes over 275 computer publications in 75 countries. Ninety million people read one or more IDG publications each month. Network World contributes to the IDG News Service, offering the latest on domestic and international computer news.

## SALES OFFICES

Carol Lasker, Advertising Director  
Debbie Lovell, Sales Associate

161 Worcester Road, Framingham, MA 01701  
(508) 875-6400/FAX: (508) 628-3976

### NORTHEAST

Tom Davis, Eastern Regional Manager  
Debbie Lovell, Sales Associate  
Donna Pomponi, Senior District Manager  
Nancy Robinson, District Manager  
Jolene Springfield, Sales Assistant  
161 Worcester Road, Framingham, MA 01701  
(508) 875-6400/FAX: (508) 628-3976

### MID-ATLANTIC

Jacqui DiBianca, Senior District Manager  
Rick Groves, District Manager, Sales Manager IntraNet Magazine  
Barbara Stewart, Sales Assistant  
351 E. Conestoga Road, Wayne, PA 19087  
(610) 971-1530/FAX: (610) 975-0837

### MIDWEST

Bob Mitchell, District Manager  
Anna Caran, Sales Assistant  
1011 E. Touhy Avenue, Suite 550, Des Plaines, IL 60018  
(847) 297-8855/FAX: (847) 827-9159

### CENTRAL

Dan Gentile, Midwest Regional Manager  
Anna Caran, Sales Assistant  
14205 Burnet Road, Suite 534, Austin, TX 78728  
(512) 246-7044/FAX: (512) 246-7703

### NORTHWEST

Sandra Kupiec, Western Regional Manager  
Paula Connor, District Manager  
Cynthia Schaeffer, District Manager  
Susan Rastellini, District Manager  
Kevin Octavio, District Manager  
Carol Stiglic, Inside Sales Representative  
Beverly Davis, Sales Assistant  
5201 Great America Parkway, Suite 440, Santa Clara, CA 95054  
(408) 567-4150/FAX: (408) 567-4166



### SOUTHWEST

Amy C. Bartulis, District Manager  
Tracy Pennell, Sales Assistant  
2171 Campus Drive, Suite 100, Irvine, CA 92715  
(714) 250-3006/FAX: (714) 833-2857

### SOUTHEAST

Don Seay, District Manager  
Terry Sanders-Prentice, Sales Assistant  
Lakeside Commons, 990 Hammond Drive,  
Suite 600, Atlanta, GA 30328  
(770) 394-0758/FAX: (770) 394-6354

## DIRECT RESPONSE ADVERTISING Response Card Decks/Marketplace

Joan Bayon Pinsky, Director Direct Response Advertising  
Clare O'Brien, Sales Manager  
Richard Black, Account Executive  
Carla Cappucci, Account Executive  
Heather Fairbanks, Account Executive  
Sharon Chin, Sales/Marketing Operations Coordinator  
Chris Gibney, Sales Assistant  
(508) 875-6400/FAX: (508) 628-3976

## RECRUITMENT ADVERTISING

Pam Valentinas, Director of Recruitment Advertising  
Tarji Murray, Sales Associate  
(508) 875-6400/FAX: (508) 820-0607

## DIRECTORY OF SERVICES

### NetworkWorld TECHNICAL SEMINARS

Network World Technical Seminars are one and two-day, intensive seminars in cities nationwide covering the latest networking technologies. All of our seminars are also available for customized on-site training. For complete and immediate information on our current seminar offerings, dial our instant fax-back service at 800-756-9430 from your touch tone phone or call a seminar representative at 800-643-4668.

Diagram your network infrastructure quickly, effectively and professionally with Network World's NetDraw v3.0 and NetDraw Plus v2.0 software. At your fingertips, you will find over 1,100 full color, vendor specific network images in the areas of LAN's, WAN's, internetworking, personal computing and much more! New product features in NetDraw Plus v2.0 include "Smartdrawings" with built-in connectpoints, "Drag and Drop" drawing, multi-layered hierarchical diagramming and customizable image libraries. Call 800-643-4668 to order your copy today! Or get immediate fax-back information by dialing 800-756-9430 and request document code #10.

Publicize your press coverage in Network World by ordering reprints of your editorial mentions. Reprints make great marketing materials and are available in quantities of 500 and up.

To order, contact Reprint Services at 612-582-3800 or 315 5th Ave, N.W., St. Paul, MN 55112.

\*Our instant fax-back service delivers information on many of these products. Dial 800-756-9430 from your touch tone phone and use the appropriate document code to have information faxed right back to your fax machine!

## EDITORIAL INDEX

3Com.....	1,6	GigaLabs.....	10	PeopleSoft.....	54
<b>A</b>		Global One.....	33,159	Philips Business Electronics.....	27
ADC Kentrox.....	21	GTE.....	118	Praxis.....	53
Adobe.....	73	<b>H</b>		PSINet.....	1,73
AGIS.....	1	Hamilton Hallmark.....	27	<b>Q</b>	
America Online.....	1,33	Hayes.....	14	Quadrtek.....	30
Ameritech.....	118	Hi/fn.....	73	Qualcomm.....	73
Ancor.....	41	HP.....	6,29,41	<b>R</b>	
ANS.....	1	<b>I</b>		Racal-Datcom.....	21
AT&T.....	33,39,159	IBM.....	1,6,10,16,21,46,56,73	RAScom.....	21
AT&T Wireless Services.....	39	ICG Communications.....	27	Red Pepper.....	54
AT&T-Unisource Services.....	159	ICS.....	41	Rockwell.....	14
Avidia.....	1	IRE.....	76	<b>S</b>	
<b>B</b>		Intel.....	6	Sanga.....	6
Bay.....	6,10,27	InterAccess.....	6	SAP AG.....	6
88N Planet.....	1,16	Interpose.....	127	S8C Communications.....	118
Bell Atlantic.....	118	InterVoice.....	8,27	Seagate.....	27
BellSouth.....	118	ISOTRO.....	30	Shiva.....	27
Best Internet.....	16	<b>K</b>		Siemens AG.....	56
Boca Research.....	14	Kaspia.....	30	Silicon Graphics.....	16
BroadVision.....	16	<b>L</b>		SMC.....	41
<b>C</b>		LCI International.....	37	Sprint.....	1,33,37,159
CA.....	6	Learning Tree International.....	127	Stanford Telecommunications.....	10
Cabletron.....	27	Lotus.....	33,56,113,127	Strategic Research.....	127
Cascade.....	6	Lucent.....	25,27,43,56	SunSoft.....	6
Cisco.....	1,10,14	<b>M</b>		Sybase.....	54
Compaq.....	14	McAfee.....	29,43	Symantec.....	29
Concert.....	159	MCI.....	1,14,33,159	<b>T</b>	
CyberCash.....	16	MFS.....		Telco Systems.....	27
CyberGuard.....	76	Microsoft.....	6,14,41,43,48,53,60,113,162	Tellabs Operations.....	33
Cylink.....	73	<b>N</b>		Telstra.....	33
<b>D</b>		NCR.....	41	Trend Micro.....	127
Data8eam.....	53	Netcom On-Line.....	1,27,73	<b>U</b>	
Dell.....	41	Netscape.....	6,56,73	U.S. Robotics.....	14,21
DFW Internet Services.....	127	Network Systems.....	73	US WEST.....	33,118
DIGEX.....	1	Newbridge.....	10,27	UUNET.....	1
Digital.....	6,41	Northern Telecom.....	33	<b>V</b>	
<b>E</b>		Novell.....	1,53,113	Verity.....	54
EMI Communications.....	37	NYNEX.....	118	Versit.....	56
Enigma.....	53	<b>O</b>		VideoServer.....	53
<b>F</b>		ODI.....	54	Visual.....	27,37
First Union.....	73	ODS.....	41	<b>W</b>	
FlowPoint.....	21	Open Market.....	16	Whistle.....	73
Fluke.....	41	<b>P</b>		<b>X</b>	
FORE.....	1,10,12	Pacific Bell.....	118	Xylan.....	6
<b>G</b>		PairGain Technologies.....	125	ATM equipment Buyer's Guide vendor list begins on Page 92.	
GDC.....	10	PC DOCS.....	60		

## ADVERTISER INDEX

Advertiser.....	Reader Service#.....	Page#.....	James River Group.....	146
ACC.....	75.....	31	*Kingston.....	83.....
AbhiWeb Corp.....	289.....	146	Know Zone, The.....	247.....
ACT Inc.....	73.....	68	Learnkey Inc.....	275.....
ADC Kentrox.....	74.....	25,27,29	Linear Switch Corp.....	293.....
Adtran.....	43.....	38	Matrox Electronic Systems.....	58.....
Alcatel Data Networks.....	45.....	93	MaxNET.....	71.....
AMP.....	44.....	58-59	Memotec Communications.....	59.....
Ascend.....		24	Mier Communications.....	159
Ascom Timeplex.....	46.....	89	Milkyway.....	93.....
Astrocom.....	237.....	146	NBase.....	6.....
AT&T Comvault Systems.....		32	Net Suite.....	141
Azure Technologies.....	224.....	153	Net2Net Corp.....	286.....
Bay Networks.....	47.....	164	Network Storage Solutions.....	70.....
Bay Networks.....	236.....	142	Newbridge.....	60.....
Border Networks.....	92.....	161	*Norlight.....	41
Cabletron.....	48.....	98-99	Nortel.....	61.....
Canon USA.....	76.....	97	Novell.....	11,13,15,34-35
Carrier Access Corp.....	251.....	142	ODS.....	91.....
Cascade Communications.....	49.....	20	OpenConnect Systems.....	62.....
Castle Rock Computing.....	252.....	141	*Pac Bell.....	66-67
Cellware.....	77.....	115	PairGain Technologies.....	84.....
Chatcom Inc.....	79.....	163	Penril Datcom.....	63.....
Comdex.....		66	QMS.....	64.....
Compaq.....		50-51,84-85	RAD Data.....	86.....
Computer Associates.....	78.....	36-37	RADCOM.....	300.....
Compware Corp.....	50.....	65	Shiva.....	65.....
Corning.....	1.....	42,43	SilCom Manufacturing.....	269.....
Cyber Computer Products Corp.....	227.....	144	Softbank Communications.....	112
Cylink Corp.....	250.....	147	Source Comm Corp.....	87.....
D-Link.....	2.....	45	Sprint.....	4
Data Interface Systems Corp.....	238.....	152	Standard Microsystems.....	85.....
Dell.....		18-19	TCG.....	88.....
Digex.....	52.....	103	Texas ISA.....	230.....
Digital Equipment Co.....	51.....	17	The Tolly Group.....	126
Distinct Corp.....	273,314.....	148	TODD Enterprises Inc.....	266.....
Dynatech.....	68.....	76	Transition Networks.....	4.....
Eastern Research.....	225.....	150	Triticom.....	260.....
EMI Communications.....	80.....	101	Tron International.....	233,278,279.....
Emulex Corp.....	255.....	145	Unisys Corp.....	71
Ergotron.....	3.....	44	UUNET.....	66.....
FastComm Communications.....	53.....	56	Verilink Corp.....	90.....
Fore Systems.....	81.....	55	Visual Networks.....	67.....
Frontier Technologies.....	274.....	143	West Hills LAN Systems.....	253.....
Frustum Group Inc, The.....	257.....	141	Wright Line.....	5.....
General Datacom.....	54.....	57	Xylan.....	89.....
General Signal Networks.....	82.....	111		
Great Lakes Case & Cabinet Co Inc.....	305.....	142		
Hewlett Packard.....		82		
Hughes Networks.....	55.....	80-81		
Hummingbird Communication.....	69.....	54		
IBM.....	22,23,61,77,106-107,108-109			
InterCon.....	56.....	64		
Interphase Corp.....	57.....	122		
ISDN Inc.....	226.....	150		
Isolation Systems.....	262.....	152		

### Network World Fusion - www.nwfusion.com

#### Advertiser

Bay Networks	Nortel
Digital Equipment Corporation	Novell
In Focus	Sprint
Microsoft	Stratacom

These indexes are provided as a reader service. Although every effort has been made to make them as complete as possible, the publication does not assume liability for errors or omissions.



## 3Com

Continued from page 1

World+Interop 96 here, include the following:

- Four Gigabit Ethernet backbone switches
- Five ATM OC-12 (622M bit/sec) backbone switches
- Five Fast Ethernet-to-Gigabit Ethernet edge switches
- Three Fast Ethernet-to-ATM OC-12 edge switches

3Com's goal is to treat Gigabit Ethernet and ATM technologies the same by developing both

product lines in tandem, one analysts said.

"If customers have started down the ATM path, 3Com's giving them plenty of bandwidth," said John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo. "And if they haven't decided, 3Com's giving them high-speed options with a full Gigabit Ethernet product line."

For customers that require quality of service, seamless LAN/WAN integration and more bandwidth today, 3Com

recommends ATM. But 3Com points users who have a lot of legacy applications and can wait for more bandwidth toward Gigabit Ethernet.

The first members of 3Com's Gigabit Ethernet product family include Fast Ethernet-to-Gigabit Ethernet edge switches as well as pure 1G bit/sec Ethernet data center switches. Likewise, 3Com will offer Fast Ethernet-to-ATM switches as well as pure 622M bit/sec ATM chassis for its ATM customers (see graphic). In addition, 3Com will roll out PCI-based Gigabit Ethernet and ATM network interface cards (NIC).

3Com's Gigabit Ethernet prices will not exceed \$2,500 per port, according to Ron Sege, senior vice president at 3Com. Pricing for the 622M bit/sec ATM switches will start at \$3,000 per port.

One 3Com user said he plans to deploy the new ATM switches.

"We just now rolled out FDDI switching in the backbone, which should suffice for the next year or two, but we're also actively looking at OC-12 ATM as a backbone technology," said

David Balding, network design engineer at Computer Sciences Corp., an information technology services firm based in Fort Worth, Texas. "We've got the human resources department looking at online resume tracking, and the engineering group is looking at electronic document management for accessing big drawings over the LAN in a client/server environment, so ATM makes sense."

## Itching for IP switching

As part of 3Com's agnostic approach to networking, the company this week will jump on the IP switching bandwagon when it unveils software for its LAN switches. Called Fast IP, the enhancement boosts net performance by reducing latency caused by routing decisions.

Fast IP will be rolled out in two stages over the next six to 18 months. In Phase 1, Fast IP will implement a cut-through rout-

ing technique to reduce network response time and improve overall performance, Sege said.

The key to Phase 2 is end-to-end switching, not routing. In this stage, Fast IP will tap into the endstation, using 3Com's intelligent adapter cards, to further eliminate router processing and overhead.

3Com's Fast IP could be best competitor Ipsilon Networks, Inc.'s IP switching approach, McConnell said.

"Ipsilon requires you to go through a bunch of switch hops before getting to the

server, and then you have to go all the way back through the network to set up the flow, whereas 3Com is talking about having the NIC figure out the setup without all this back-and-forth stuff," he said.

"So, 3Com's approach may cut down the latency, and it may have some implications on scaling for large networks," he said.

©3Com: (408) 764-5000.



3Com's Sege says he expects the company's Gigabit Ethernet switches to cost about \$2,500 per port.

## Take your pick

## 3Com has big plans for both Gigabit Ethernet and ATM switches

## Gigabit Ethernet road map

## Fast Ethernet-to-Gigabit Ethernet edge switches

48-port Fast Ethernet/12-port Gigabit Ethernet chassis	First half of 1997
360-port Fast Ethernet/28-port Gigabit Ethernet chassis	Second half of 1997
36-port Fast Ethernet/2-port Gigabit Ethernet stackable switch	Second half of 1997
36-port Fast Ethernet/3-port Gigabit Ethernet stackable switch	First half of 1998

## Gigabit Ethernet core switches

16-port Gigabit Ethernet chassis	First half of 1997
30-port Gigabit Ethernet chassis	Second half of 1997
4-port Gigabit Ethernet stackable switch	Second half of 1997
24-port Gigabit Ethernet stackable switch	First half of 1998
96-port Gigabit Ethernet stackable switch	First half of 1998

## ATM road map

## Fast Ethernet-to-ATM OC-12 (622M bit/sec) edge switches

48-port Fast Ethernet/12-port ATM chassis	First half of 1997
240-port Fast Ethernet/30-port ATM chassis	Second half of 1997
36-port Fast Ethernet/2-port ATM stackable switch	Second half of 1997
480-port Fast Ethernet/30-port ATM chassis	First half of 1998
56-port Fast Ethernet/7-port ATM stackable switch	First half of 1998

## ATM OC-12 core switches

16-port ATM chassis	First half of 1997
32-port ATM chassis	Second half of 1997
8-port ATM chassis	First half of 1998

## Alliance

Continued from page 1

others. Being a member of the group doesn't mean products from FORE or IBM are imminent, sources said. However, both firms do want to be positioned to tap a market that is rapidly gaining strength.

The Gigabit Ethernet market is expected to approach \$3 billion by the year 2000, according to Dataquest, Inc., a market research firm in San Jose, Calif.

"This announcement means that FORE and IBM have seen the light and that ATM is not, contrary to what both companies have said, the industry cure-all and that they must now go back and cover their tracks," said Anura Guruge, an independent analyst based in New Ipswich, N.H.

Others argued that the companies' move to join the Gigabit Ethernet Alliance comes after a much slower than anticipated market acceptance of ATM. In

addition, industry observers pointed out FORE and IBM could gain a tactical advantage by joining the group, since they will be kept up-to-date on the competing technology.

"At this point in time, any

## Getting behind Gigabit Ethernet

## A sampling of Gigabit Ethernet Alliance members

▶ 3Com	▶ Ipsilon
▶ Bay	▶ Madge
▶ Cabletron	▶ NBase
▶ Cisco	▶ Packet Engines
▶ Compaq	▶ Prominet
▶ Digital	▶ Sun
▶ HP	▶ XLNT Designs
▶ Intel	▶ Xylan

major vendor that doesn't look to the Gigabit Ethernet market is overlooking a tremendous opportunity," said Fred McClimans, president of Current Analysis, Inc., a market analysis firm in Ashburn, Va. "We are at the point here in the industry where single-technology vendors do

not survive very long."

McClimans said FORE's membership in the Gigabit Ethernet Alliance does not undermine the company's ATM focus (see story, page 12).

"FORE was started on an ATM principal, and they went after that core ATM market very aggressively. And they continue to do extremely well," McClimans said. "I see this as a maturing of FORE that started with the acquisition of [Applied Network Technologies, Inc.] and then the acquisition of Alantec Corp. FORE moved into other technologies and leveraged their ATM experience and ATM base throughout the network."

This is also a smart move for IBM, said Nick Lippus, president of Strategic Networks Consulting, Inc. in Rockland, Mass.

"No question that IBM has a lot of money tied up in ATM, but they can't afford to get so tied up in one technology that they can't develop others," he said. ■

## Phone rules

Continued from page 1

15% to 20% of long-distance costs by knocking off the 3 to 4 cents-per-minute fee on either end of a long-distance switched voice or data connection, Anderson said.

Federal Communications Commission rules now say that in

order to avoid access fees, LECs must own their own phone switches. PBXs that most corporations already have meet that requirement.

"We're now telling our 200 largest end users that if they don't investigate the option to sign up as a competitive local exchange carrier, they should be taken out and shot," Anderson said.

He will deliver the idea of enterprise LECs, or ELEC, at an MCI Communications Corp. large customers' meeting next week in Palm Springs, Calif.

Anderson said, on paper, the corporate user would become its own local carrier, providing access to long-distance carriers' networks. To do so, they would buy individual network elements from the RBOCs but not access to the RBOC network as a whole, hence no access fee.

While the savings sounds attractive, it does not come without a price, according to Eric Paulak, an analyst with Gartner Group, Inc. The corporate user would have to make legal filings in each state where it wanted to be a LEC, and file tariffs.

"How many companies are going to want to be local exchange carriers and fall under

state regulations as well as federal regulations?" Paulak said.

"You'd have to offer service over that network to anybody who asked for it. I don't think you want to do that," said Coleen Boothby, a Washington, D.C. attorney specializing in negotiating telecommunications contracts for large users.

And the ELEC could actually be forced to provide phone service to high-cost areas or expand coverage to places where the company has no network now. "Being a carrier isn't all wine and roses," Boothby said.

Anderson dismissed the risks. As a practical matter, no one would ask an ELEC for service, and if they did, they would have to pay whatever rates the carrier set.

The access fees are already at the center of controversy. The FCC wants to do away with them for LECs that are truly in the phone business and own switches. But RBOCs say they could not swallow the loss of \$25 billion per year that would mean.

Eventually, the FCC may close the apparent loophole, but the ELEC move is worth a shot because users who move now may be grandfathered later, he said. ■

*"We're now telling our 200 largest end users that if they don't investigate the option to sign up as a competitive local exchange carrier, they should be taken out and shot."*



# AT&T alliance to offer global ATM

By David Rohde

Washington, D.C.

AT&T-Unisource Services is gunning to be the first of the three global network alliances involving big U.S. carriers to launch an international ATM service.

The alliance plans to begin by mid-1997 a controlled introduction of an ATM service that would enable companies to link high-speed networks in the U.S. and several European countries, AT&T officials confirmed last week.

Such a high-end service is not likely to win lots of customers early on, and AT&T officials harbor no illusions about capturing big market share simply by being the first with the service.

But the service could meet a real need among corporations facing growing traffic demands on their international nets, said David Beering, a senior telecom staff analyst at worldwide oil and chemicals company Amoco Corp.

Amoco is immersed in a project to merge multiple domestic networks into a single ATM net. Under Beering's leadership, the petroleum industry has built a highly publicized ATM network that has served as a test bed for high-speed technologies.

## Who's who in global nets

### The three major global alliances:

Alliance	Owners
AT&T-Unisource Services	AT&T, PTTs of Netherlands, Spain, Switzerland, Sweden
Concert	MCI, British Telecom
Global One	Sprint, France Telecom, Germany's Deutsche Telekom

nications Corp.-backed Concert global alliance said the company plans to offer global ATM at some point but has no specific timetable.

A spokeswoman for the Sprint Corp.-backed Global One alliance would only say that the company has announced no

such service.

AT&T's global ATM plans were revealed earlier this month at a meeting of U.S. customers of Swiss Telecom, one of four European carriers that are part owners of AT&T-Unisource Services.

A pan-European ATM pilot is already under way, said Joseph Nancoz, Swiss Telecom's vice president of multinational corporate accounts. When the trans-Atlantic global ATM service is launched, it will ini-

tiall accommodate data applications, but not voice.

AT&T did not say whether its World-Partners Alliance, a superset of its Unisource venture that provides telecommunications services to many other countries, will soon participate in the global ATM offering.

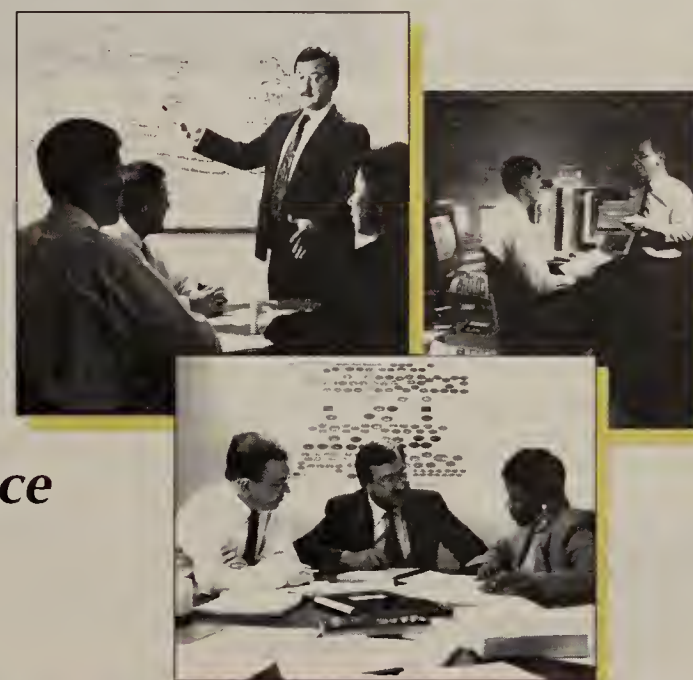
Senior Editor Joanie Wexler contributed to this story.

# The Switch Book

## Mier Communications' Latest Report:

### One-Stop Guide for Serious LAN-Switch Shoppers.

### Also, LAN-Switch Marketplace Trends and Analyses



## WHAT'S INCLUDED:

- Side-by-Side Product Profiles of over 120 LAN Switches, including Configurations, Module Options, Media, Management and More
- Analysis of the LAN Switch Marketplace with Charts Summarizing Vendors and LAN Switches Currently Available
- Guides to Key Features, such as SNMP Management, Filtering, Switching Modes and Bridging Capabilities
- Detailed Per-Port Pricing Analysis
- Warranty and Support Options

## OTHER MIER COMMUNICATIONS SPECIAL TECHNOLOGY REPORTS:

*TAKING ATM TO TASK: TECHNOLOGY ANALYSIS & PRODUCT COMPARISON*  
*TWO-VOLUME REPORT ON TCP/IP: IMPLEMENTING TCP/IP AND BUYING TCP/IP*  
*ANALYZING AND SELECTING WEB SERVERS*

These Special Technology Reports are Available Now. Call:



# 1-800-MIER COM



## Mier Communications, Inc.

99 Hightstown Road, Princeton Junction, NJ 08550

Telephone: 609-275-7311; Fax: 609-275-8813

<http://www.mier.com>

"Whether commercial global ATM services are a big deal depends simply on the economics" and the network's reach, Beering said. "If it's cheaper per bit, it's worth it."

Beering added that an ATM service between the U.S. and Unisource countries alone would not cut it for his company. "Global means they can get me to Guam or anywhere else I have operations," he said.

Dan Dzamba, AT&T's international packet services director, said the company is seeing more and more companies supporting multimedia applications internationally, and some of these users are exploring moving international Internet or intranet traffic over ATM.

In fact, some of the first customers for global ATM service will likely be Internet service providers, which are "aggregating a tremendous number of traffic types," Dzamba said.

For AT&T, the launch of a global ATM service could be something of a role-reversal, since it originally ceded the initiative in U.S. commercial ATM service to Sprint Corp. and what is now LDDS WorldCom in the early 1990s.

A spokeswoman for the MCI Commu-



## Novell

Continued from page 1

With Novell having been a leader in the network software market for so long, what is it like to work for the company now that it is on the defensive?

We still are the market leader; I want to make sure you have that clear because it seems as if people have forgotten that. By a long shot. We sold 800,000 servers last year, and we will sell a million servers this year.

Defensive is the right word, though. That happens when a company goes through some of the things that we did, i.e. the WordPerfect acquisition/divestiture and all of the other stops and starts.

Your messages to the marketplace are perceived as passive, and you become quiet and dark. What happens is people in the press start to print and the print turns into bad news. Employees start to read the bad news and believe it.

The key is: How do you get the employees to feel the passion again?

What are your plans to stop Novell's hemorrhaging of executives?

First of all, there isn't a hemorrhaging of people leaving Novell. With a lot of the officials that have left the company, there were mutual partings that have taken place.

## WHO IS JOE MARENGI?

► Promoted to president of Novell on Aug 29; previously was executive vice president of worldwide sales, overseeing more than 1,600 sales executives.

► Before coming to Novell in 1989, he was the director of channels for Excelan and national sales manager for Kinetics.

► Holds a bachelor's degree from the University of Massachusetts and a master's from the University of Southern California.



tomers and resellers describe you as a very competitive person. What is going to be your approach to the competition Microsoft poses?

Competing with Microsoft is obviously something that we have to do. What I want to do is make sure that the customer

Novell CEO and President Robert Frankenberg did?

I imagine that we will eventually do that. It is not the No. 1 priority on my list right now, but I think that would be in order.

What is your position on Microsoft's business practices as brought up by Netscape?

I have no comment on that.

What do you have to say about the acquisition/merger rumors that are circulating as a result of the internal and overall perception problem Novell has?

The fundamental answer to that is simple. We are positioning the company as a total stand-alone. We are still building infrastructure outside of the U.S. We are still recruiting employees inside the company. We have got huge development projects going on. We are looking for a new CEO. Those are not things that you do if you are trying to window-dress the company for a sale.

Going forward, what is your overall vision for Novell?

Vision is a dangerous word because the vision of the company is still the same as the one that Bob [Frankenberg] put in place and it still works very well. That is, allowing Novell and its partners to create a network where people communicate and collaborate anytime, anywhere, with anyone. So that high-level vision stays.

The direction of the company, as we migrate from LANs to WANs to the intranet, is becoming a major player in the intranet space, which we see is the evolution of the corporate network.

## Get more info online, including:

- The complete transcript of our interview with Joe Marengi
- What analysts are saying Novell must accomplish in the next year
- One user's look at the importance of the next version of NetWare

Type the number to the right in the DocFinder box on the home page.

NetworkWorld Fusion: <http://www.nwfusion.com>

How are you going to reach that point, and how will you convince customers that you are moving that way?

How we are doing it from a product perspective is breaking the products up into three different categories. The first is server operating systems as we migrate from NetWare as a platform and move it into the intranet space.

In addition to that, we are distributing the services of our products, such as directory, security and management, onto

other server operating systems such as NT, Unix and others.

Then another piece of our strategy moves us into what the user sees, hence the need for products like GroupWise. These products give the user an intuitive interface, a way to access the network for very specific tasks.

What do you feel in your experience of vice president of sales qualifies you to carry out this new company direction toward the intranet and help the company deal with its perception problem?

There are two major areas. The first is putting the customer at the forefront of the equation. I am talking about both in our marketing efforts and our prod-



uct development efforts. We really have to understand what the customer needs in order for this to be successful. Just putting technology in the market; it just doesn't work.

Because I come from the customer environment, if you will, that is one of the most important things that I bring to the company.

The other part of it is the ability to lead, the ability to create leadership and make Novell become passionate again about being the greatest company in the networkingspace.

What is your prediction of where Novell will be in a year's time?

We will have maintained our market share in the server operating system business. We will have created enough mind share that people will recognize us as an intranet player — primarily in the corporate intranet space.

GroupWise will have evolved into the No. 2 position in the marketplace — probably second to Lotus Notes. And we will have shipped some technology that people will say, "God, I didn't realize that Novell was that good."

The directory will be on its way to becoming the meta-directory in the industry due to some of the strategy that we are moving on in that arena. And people will be asking themselves why they didn't buy our stock when it was at 10 1/2. ■

## NetworkWorld

161 Worcester Road  
Framingham, Mass. 01701-9172  
(508) 875-6400

Periodicals postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #0385662. Network World (ISSN 0887-7661) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write Network World at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Nonqualified subscribers: \$5.00 a copy; U.S. - \$129 a year (except Washington, DC, Utah and Florida \$136.74); Canada - \$160.50 (including 7% GST, GST #126659952); Central & South America - \$150 a year (surface mail); Europe - \$205 a year (surface mail), all other countries - \$300 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label from front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106.

Network World is distributed free of charge in the U.S. to qualified management or professionals who meet ALL of the following criteria:

- 1) Have site purchasing influence.
- 2) Are involved in the purchase of network products and services.
- 3) Have multi-platform networks installed or planned (including network architectures, LAN operating systems and LAN environments).

PHOTOCOPY RIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Network World, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus 50 cents per page is paid to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970.

POSTMASTER: Send Change of Address to Network World, P.O. Box 3090, Northbrook, IL 60065.

Copyright 1996 by Network World, Inc. All rights reserved. Reproduction of material appearing in Network World is forbidden without written permission.



Reprints (minimum 500 copies) and permission to reprint may be purchased from Reprint Services, 315 5th Ave. N.W., St. Paul, MN 55112 (612) 582-3800.

USPS 735-730

But what happens when people leave the company to either found their own companies or go to start-ups, the one thing they always bring with them is an extension of the company they just came from. So, as corny as this is going to sound, when employees leave your company to go do something that may be more exciting to them, it often-times is beneficial to you as a company because what you have just done is expanded your extended family out into the marketplace.

Some of Novell's biggest cus-

## Exchange

Continued from page 6

the Web Connector, which enabled browser access but performed an additional translation step.

Another feature is a Lotus cc:Mail Connector for exchanging data and messages between cc:Mail and Exchange.

Version 4.5 will also make Exchange easier to deploy across several networked sites, something that struck a chord with customers.

"Doing things like moving mailboxes between sites can involve hours of administration time [with Exchange 4.0]," said Les Brown, system analyst at Shell Services Co. in Houston, which is migrating about 16,000 users to Exchange. The company had planned to set up as many as 30 Exchange sites on its network, but has scaled that back to six due to limitations in Version 4.0.

Version 4.5 should eliminate the need to run a fairly centralized architecture by allowing administrators to create sub-sites, customers said. This permits users at different physical sites to be grouped together for

has what it needs from both companies.

Novell has always represented the Switzerland type of approach in the marketplace. If part of Novell overlaps with Microsoft, then, yeah, we are going to compete with them. Competition in the marketplace is not healthy if it does become adversarial, which it did for a while between the two companies. The one that loses in that situation is the customer.

Have you recently met or do you have any plans to meet personally with Bill Gates as former

administrative purposes.

Ned Studt, a systems administrator at the Kentucky Department of Education, said Version 4.5's feature set is impressive.

"We didn't expect to see some of this stuff for two years," he said.

Studt and colleague Kirk Reeves, who will eventually support some 200,000 users on an Exchange network, will have to wait until 1997 for the improved diagnostic tools and expanded reports they crave.

Improving the enterprise readiness of Exchange filled the minds of many of the more than 2,000 attendees that packed the Exchange lovefest.

Since Exchange shipped in April, there have been rumblings that the messaging package is not being rolled out for mass deployments, possibly due to bugs and a lack of scalability features.

Still, many companies appear to be embracing Exchange. A recent International Data Group report puts the number of Exchange users at about 750,000.

However, it is tough to find sites running more than a few thousand seats. ■



## ATM

Continued from page 1

research firm in Dedham, Mass. "This brings ATM down to just about the same price as switched Ethernet, which now makes ATM a viable choice for the desktop."

One customer, who has already deployed one of the switches in his network, agreed.

"We're using the Avidia box to provide 25M bit/sec ATM links to the desktop for our engineers," said Andy Deltuvia, vice president of network engineering at LANcomp, Inc., a network product vendor in Piscataway, N.J. "Not only was the price per port very attractive, but it was relatively painless to set up and configure."

## Auspicious start

Avidia — a venture-funded company made up of former officials from FORE, General DataComm, Inc., 3Com Corp. and Digital Equipment Corp. — is focused on bringing ATM connections to PCs and servers, but will avoid the ATM backbone market, explained Mark Juliano, vice chairman at Avidia and formerly vice president of marketing at FORE.

"This is ATM for the rest of us," Juliano said. "In fact, at about \$2,300 fully loaded, the entire ATM switch will cost less than the PC. Heck, I can sell you two switches and a few NIC cards for \$5,000, which is probably the limit on your credit card."

Juliano said his company is able to keep its costs down by using an inexpensive chip from TranSwitch Corp., as well as using off-the-shelf products such as Intel Corp. processors and a PC-based bus.

## Product specifics

Avidia's product family includes the ACX-100 workgroup switch, which provides 12 25M bit/sec ATM ports and one 155M bit/sec interface for a server or backbone link. The switch can act as a stand-alone device or as a module that plugs into Avidia's other switch chassis.

Customers can stick the ACX-100 into the larger ACX-300 chassis to create a department-level device. The three-slot box supports as many as 36 25M bit/sec ATM ports and three 155M bit/sec interfaces. Both the 100 and 300 models have a switching capacity of 1G bit/sec.

For department-level concentration,

Avidia offers the ACX-1200, which boasts a switching capacity of 3G bit/sec. The switch supports as many as 120 25M bit/sec ATM ports and as many as 10 155M bit/sec ATM links.

In addition, the 1200 offers a variety of WAN interfaces, including T-1/E-1, ISDN and frame relay.

Deltuvia said he likes having a WAN interface option on the box. "Using frame relay, I can cost-effectively scale

ATM out to the wide area," he said. "And that may eliminate the need for a router at that endpoint."

In addition, the company is introducing the Avidia Internet Management System (AIMS), which allows customers to manage the switches from a Web browser.

The ACX family will begin shipping in October, and the WAN access interfaces will be available by year-end.

©Avidia: (203) 265-5612.

## PROFILE: AVIDIA SYSTEMS

**Headquarters:** Wallingford, Conn.

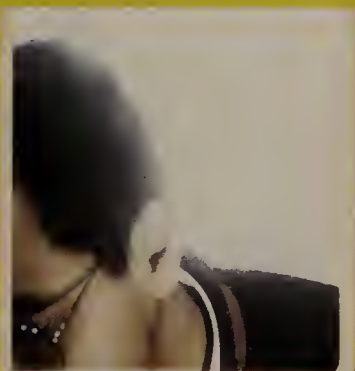
**Founded:** 1995

**Key products:** Workgroup ATM switches and remote office connectivity products

**Management team:** Officials formerly with FORE, General DataComm, 3Com and Digital, TranSwitch and ITT



Avidia's Juliano said his company's \$199-per-port ATM switch will bring ATM to the desktop.



He's 32.  
Dresses like Kramer.



Thinks like Marx.



Bowls 102.



And he's about to  
download your company's  
new product plans.

You don't know him. But he might know you. The fact is, hackers can be virtually anyone. Anywhere. So you need to protect your network with products that guard against their every move. Consider BorderWare.

Our suite of products and applications address every conceivable aspect of network security: firewalls, web filtering, identification, authentication, accounting, auditing and encryption. Providing open-ended solutions that are quickly and easily integrated into any existing network security strategy.

Is your organization big? Small? Somewhere in between? We offer two firewall solutions: a highly configurable firewall and one designed for plug and play simplicity. But more important than how big you are, is how big you'll become. Rest assured, our firewalls are configured to grow as you do.

Our web filter is another invaluable application for today's network environment. It enables you to monitor and control employee Internet activity by blocking access to indecent and non-business content. The potential for a hostile environment is eliminated and productivity is maximized through logging and reporting usage.

Remember, the whole world is watching. Count on Secure Computing Corporation for the intelligent solution to network security.

<http://www.borderware.com>

**BORDERWARE**

by Secure Computing Corporation

All trademarks are the property of their respective owners.

Call us at 1-800-334-8195 or +1(416) 368-0171. Fax +1(416) 368-7789. 20 Toronto Street, Ste. 400, Toronto, Ontario, Canada M5C 2B8.

Circle Reader Service #92



## 'A thought that makes me hazy, is it me or are others crazy?' \*

**I** just got off the phone with my esteemed editor, and what a stimulating conversation! What a keen mind he has. And his wit! Incisive and insightful. (OK, Gibbs, cut it out. We'll keep you on for another year. Ed.)

My editor and I were discussing one of the Internet mail lists I run (more on that later). Out of our incredibly intellectual exchange (we cracked a lot of jokes) came the following thought: The Internet is a web of backbones, both physical and logical.

The physical backbones are the big, fat data pipes belonging to AT&T, MCI, Sprint, ANS and so on. Of more interest from a philosophical viewpoint are the logical ones.

These logical backbones are defined by what are effectively permanent data-streams that serve different interests and functions.

For example, E-mail transactions are a crucial Internet backbone. I remember reading somewhere that E-mail consumes about 6% of the Internet's bandwidth. That's an interesting figure when you consider that the slice of total Internet bandwidth used by MUDs, MOOs, MUSHes and MUCKs is estimated to be about 10%!

<digression> MUDs, MOOs, MUSHes and MUCKs stand for Multi-User Dungeons and Dragons, MUD Object-Orienteds (yes, I did notice that doesn't read right, but this is technology, my friend) and Multi-User Shared Hallucinations. MUCK apparently is not an acronym — it just amused some dweeb somewhere to call their MUD a MUCK, and it stuck. That's the 'Net for you. If you want to find out more about this strange world, check out "Secrets of the MUD Wizards" by Andrew Busey, published by SAMS.net.

And if you want to try a Web-based MOO, check out WaxMOO at <http://bug.village.virginia.edu/>. WaxMOO is based on the 1991 film *Wax or the Discovery of Television Among the Bees* by David Blair. WaxMOO is simultaneously a truly weird virtual place and a work of art.</digression>

What are some of the other backbones? Well, there's good ol' Usenet, home of the newsgroups, and then

*The Internet is a web of physical and logical backbones.*

there's the World-Wide Web and Gopher.

Of course, you might also consider all of the voice-over-'Net products (such as those from VocalTec) to form a backbone of their own, but until these products are interoperable, it's not a real backbone. (C'mon, guys, get with it if you want a real business.)

On top of all that, there are meta-backbones. Here I'm thinking of the topics people communicate about, such as sex. This is a huge backbone and one that wields rather greater economic power than one might think.

For example, there's a large video pornography broadcast industry that uses a popular Internet videoconferencing tool. These services must be pretty popular if you consider how many ads for them you now see in magazines.

**Mark Gibbs**

Other, rather more tasteful, meta-backbones include all of the computer topics mediated by newsgroups and Web sites and, the thing that actually got me thinking about this in the first place, humor.

Humor on the Internet is a great resource (some of my best ad-libs have come from the 'Net) and one of the most profound meta-backbones that I know of.

Exchanging jokes gives people an opportunity to get connected and keep in contact. For example, my own joke mailing list, JokeServ, keeps me in touch with about 150 friends from all over the world.

Perhaps we'll look back in 10 years' time and realize that it was only the humor on the 'Net that stopped the 'Net from driving us crazy.

Want to join JokeServ? Go to <http://www.gibbs.com/JokeServ> and register (it's the only way to join). For any other purpose, drop Gibbs a line at [mgibbs@gibbs.com](mailto:mgibbs@gibbs.com) or call him at (800) 622-1108, Ext. 504.

\* Said by Albert Einstein. Honest.

## Users face software price hikes from nervous vendors

**T**he flower child era of caring and sharing that built the Internet is over. Now it's pure business, which means 'Net users face the new prospect of paying more for the privilege of connectivity.

I have written earlier about moves that telephone companies are making to charge Internet users higher service fees. This column is about another money-related area poised for change: pricing system and application software.

Pricing software used to be easy. Mainframe software vendors charged fees based on processor size and number of terminals. Network operating system vendors based fees on a maximum number of users. PC software vendors charged fees based on... well, PCs. One PC, one sale; 10,000 PCs, 10,000 sales.

Users quickly figured out how to wring more value from software vendors, especially during the growth of networking. All users obviously did not use all software packages concurrently. So IS managers negotiated volume discounts and

server operating system, forcing use of the \$1,080 NT Server version.

Web administrators had been moving from free Unix-based servers to the cheap version of NT because it's easier to use than Unix. Microsoft's move angered them and competitors, who claimed no benefits or technical differences to justify the more expensive NT version. Microsoft has vigorously contested such charges.

I don't know why Microsoft is bothering to counter those claims. The company has every right to brand its product line for maximizing revenue, whether by technical or legal means. Regulating product use with a license agreement might seem like a new technique to Internet users, but technically crippling a product is not.

U.S.-based software vendors, for instance, cripple encryption features of products shipped to overseas customers. It's either that or go to jail. Software vendors that sell products over the Internet frequently offer a free "lite" version. Users have to pay for the pro version to get a full set of features. Sometimes

shareware authors also use the cripple strategy, shipping a full-function version only if you pay.

Microsoft's decision to cripple NT Workstation via a licensing restriction is just a new twist on an old strategy. Users were particularly vocal about this ploy because they are used to getting a lot of Internet-related software for free. Well, gang, the free ride is over.

It's over because major software vendors like Microsoft are in a bind. Sure they need to maximize revenue. But they also need to replace future lost revenue as Internet/intranet applications supplant bread-and-butter products.

One surprising change will be eliminating upgrade fees. Vendors will continuously and automatically update system and application software via the Internet. In exchange, they'll collect ongoing usage fees with electronic cash. Less headache, but bye-bye freeware.

The age of innocence for Internet users is gone. Microsoft's action is just a wake-up call, alerting us that big changes are in store for software pricing.

Buerger is a networking industry consultant and writer in Atlanta. He can be reached at [dave@buerger.com](mailto:dave@buerger.com).

**Dave Buerger**

*Microsoft has every right to brand its product line for maximizing revenue, whether by technical or legal means.*

used software metering to cut costs.

Meanwhile, the Internet and its related cousin, intranets, have fired the computing world's imagination. Users are eager to reap even more cost savings with applications developed with browsers and Web servers. This information access model is easy to use and requires fewer, less expensive components.

But not so fast. Reliable, secure Internet/intranet products are now coming from for-profit corporations. That's a big switch from the cooperative free spirits who developed the Internet and its standards. Products that were once low- or no-cost will now come at price.

The first major volley was recently fired by Microsoft Corp. with its new licensing policy for the \$260 workstation version of Windows NT 4.0. The license essentially prohibits its use as a Web



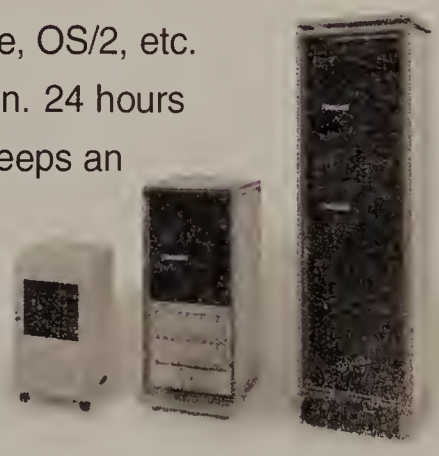


# His server is down. Lunch plans have changed. Network managers are now on the menu.

Relax. All ChatterBox™ integrated multi-server systems include ChatCom's unique Intelli-Management™ monitoring and control feature. Combining dedicated microprocessors with smart software, Intelli-Management alerts you as soon as any problem arises in the ChatterBox. And it does so in any networking

environment—Windows NT, NetWare, OS/2, etc.—using standard SNMP presentation. 24 hours a day, 7 days a week, ChatterBox keeps an eye on itself, so you stay out of hairy situations.

**Introducing the new ChatterBox Corporate Series and Office Series.  
Strategic solutions for consolidating and clustering your server applications.**



 **ChatCom, Inc.**  
ChatterBox™ Communications and Server Solutions

(800) 456-1333 Fax (818) 882-9134  
ChatCom, Inc., 9600 Topanga Canyon Blvd., Chatsworth, CA 91311

<http://www.jlchatcom.com>

©1996, ChatCom, Inc. Trademarks are property of their respective owners



10 Mbps Or 100 Mbps  
On Any Port.



Now That's A Switch.

Now The Most Popular Fast Ethernet Switch Is Also The Most Affordable!



**BayStack™**

Network traffic only increases. That's why we offer the BayStack 28115 Fast Ethernet Switch. Not only is it the world's most popular Fast Ethernet Switch, but it also offers the best price/performance of any switch available. It lets you deploy 10 or 100 Mbps Fast Ethernet switching on all ports, so you can future-proof your network—adding bandwidth where and when you need it.

Equally important, you also get big-network reliability with redundant links and redundant power. That's because the 28115 Fast Ethernet Switch is part of our BayStack family that integrates hubs, routers and switches into a stackable, standards-based system. And with Optivity®, you can manage your entire network as one cohesive unit—including remote sites.

So call **1-800-8-BAYNET ext. 142** for a free copy of our Fast Ethernet Deployment Guide and CD. Because if you're considering switching, now's the perfect time.

